

DRINKING WATER SURVEILLANCE PROGRAM

**FORT FRANCES
WATER TREATMENT
PLANT**

ANNUAL REPORT 1990



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FORT FRANCES WATER TREATMENT PLANT

DRINKING WATER SURVEILLANCE PROGRAM

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EXECUTIVE SUMMARY
DRINKING WATER SURVEILLANCE PROGRAM
FORT FRANCES WATER TREATMENT PLANT
1990 ANNUAL REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

The Fort Frances water treatment plant is a conventional treatment plant which treats water from the Rainy River. The process consists of coagulation, flocculation, clarification (upflow clarifier), filtration, corrosion control, fluoridation and disinfection. This plant has a design capacity of 16,900 x 1000 m³/day. The Fort Frances water treatment plant serves a population of approximately 8,700.

Water at the plant and at three locations in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall.

Table A is a summary of all results by group.

One health related guideline, lead was exceeded three times at one distribution site. The District Officer was notified.

The Fort Frances water treatment plant, for the sample year 1990, produced "adequate" quality water and this was maintained in one of two distribution system sites.

The detection of elevated lead and copper in the standing water samples in the distribution system would indicate that household taps should be flushed well before water is used for consumption.

TABLE A
DRINKING WATER SURVEILLANCE PROGRAM FORT FRANCES WTP

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DEMOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A '-' INDICATES THAT NO SAMPLE WAS TAKEN

SCAN	SITE	RAW			TREATED			SITE 1			SITE 2			SITE 3		
		TESTS	POSITIVE	%POSITIVE	TESTS	POSITIVE	%POSITIVE	TESTS	POSITIVE	%POSITIVE	TESTS	POSITIVE	%POSITIVE	TESTS	POSITIVE	%POSITIVE
BACTERIOLOGICAL		0	0	0	0	0	0	0	0	0	-	-	-	3	1	33
CHEMISTRY (FLD)		36	36	100	70	70	100	130	120	92	10	100	100	132	120	90
CHEMISTRY (LAB)		252	199	78	252	197	78	401	357	89	36	91	398	352	88	88
METALS		288	90	31	288	71	24	552	178	32	-	-	529	168	31	31
CHLOROAROMATICS		154	0	0	140	0	0	154	0	0	-	-	154	0	0	0
CHLOROPHENOLS		12	0	0	6	0	0	-	-	-	-	-	-	-	-	-
PAH		186	0	0	186	0	0	17	0	0	-	-	17	0	0	0
PESTICIDES & PCB		369	0	0	342	1	0	234	0	0	-	-	234	0	0	0
PHENOLICS		12	3	25	11	4	36	-	-	-	-	-	-	-	-	-
SPECIFIC PESTICIDES		63	0	0	56	0	0	11	0	0	-	-	11	0	0	0
VOLATILES		348	0	0	319	33	10	348	36	10	29	3	348	36	10	10
TOTAL		1740	328		1670	376		1850	691	75	46		1826	677		

DRINKING WATER SURVEILLANCE PROGRAM

FORT FRANCES WATER TREATMENT PLANT 1990 ANNUAL REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

Appendix A has a full description of the DWSP.

The DWSP was initiated for the Fort Frances water treatment plant in the fall of 1988. A previous annual report was published for 1989.

PLANT DESCRIPTION

The Fort Frances water treatment plant is a conventional treatment plant which treats water from the Rainy River. The process consists of coagulation, flocculation, clarification (upflow clarifier), filtration, corrosion control, fluoridation and disinfection. This plant has a designed capacity of $16.900 \times 1000 \text{ m}^3/\text{day}$. The Fort Frances water treatment plant serves a population of approximately 8,700.

The sample day flows ranged from $5.208 \times 1000 \text{ m}^3/\text{day}$ to $8.630 \times 1000 \text{ m}^3/\text{day}$.

General plant information is presented in Table 1 and a schematic of plant processes, chemical addition points and sampling locations in Figure 1.

SAMPLING AND ANALYSES

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

At all distribution system locations two types of samples were obtained, a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples were used to make an assessment of the change in the levels of inorganic compounds and metals, due to leaching from, or deposition on, the

plumbing system. The only analyses carried out on the standing samples therefore, were General Chemistry and Metals. The free flow sample represented fresh water from the distribution system main, since the sample tap was flushed for five minutes prior to sampling.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. Retention time was calculated by dividing the volume of water between two sampling points by sample day flow. For example, if it was determined that retention time within the plant was five hours, then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

Stringent DWSP sampling protocols were followed to ensure that all samples were taken in a uniform manner (see Appendix B).

Plant operating personnel routinely analyze parameters for process control (Table 2).

Water at the plant and at three locations in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall. Laboratory analyses were conducted at the Ministry of the Environment facilities in Rexdale, Ontario.

RESULTS

Field measurements were recorded on the day of sampling and were entered onto the DWSP database as submitted by plant personnel.

Table 3 contains information on delay time between raw and treated water sampling, flow rate, and treatment chemical dosages.

Table 4 is a summary break-down of the number of water samples analyzed by parameter and by water type. The number of times that a positive or trace result was detected is also reported.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be

confidently quantified.

Table 5 presents the results for parameters detected on at least one occasion.

Table 6 lists all parameters analyzed in the DWSP.

Associated guidelines and detection limits are also supplied on Tables 5 and 6. Parameters are listed alphabetically within each scan.

DISCUSSION

GENERAL

Water quality was judged by comparison with the Ontario Drinking Water Objectives publication (ODWOs). When an Ontario Drinking Water Objective (ODWO) was not available, guidelines/limits from other agencies were used. These guidelines were obtained from the Parameter Listing System database.

IN THIS REPORT, DISCUSSION IS LIMITED TO:

- **THE TREATED AND DISTRIBUTED WATER;**
- **ONLY THOSE PARAMETERS WITH CONCENTRATIONS ABOVE GUIDELINE VALUES; AND**
- **POSITIVE ORGANIC PARAMETERS DETECTED.**

BACTERIOLOGICAL

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality. Routine monitoring programs usually require that multiple samples be collected in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples.

Standard plate count was the only bacteriological analysis conducted on the treated and distributed water. No results were above the guideline.

INORGANIC & PHYSICAL

Mechanical problems with the sodium carbonate feeder during October created an imbalance in the plant operational treatment process causing a number of chemical parameters to be outside of the operational guidelines.

CHEMISTRY (FIELD)

Field pH was lower than the ODWO Aesthetic or Recommended Operational Guideline of 6.5-8.5 pH units in the treated and distributed water samples in October with minimum reported values less than 6.0 pH units. These low values were confirmed in the laboratory pH.

It is desirable that the temperature of drinking water be less than 15°C. The palatability of water is enhanced by its coolness. A temperature below 15°C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and corrosion problems. The temperature of the delivered water may increase in the distribution system due to the warming effect of the soil in late summer and fall and/or as a result of higher temperatures in the source water.

Field temperature exceeded the ODWO Maximum Desirable Concentration of 15°C in 12 of 37 treated and distributed water samples with a maximum reported value of 21.9°C.

CHEMISTRY (LAB)

Alkalinity was reported below the ODWO Aesthetic or Recommended Operational Guideline of 30-500 mg/L in 8 of 34 treated and distributed water samples with a minimum reported value of 2.2 mg/L in October.

Colour in drinking water may be due to the presence of natural or synthetic substances as well as certain metallic ions.

Colour exceeded the ODWO Maximum Desirable Concentration of 5 HZU in 1 of 34 treated and distributed water samples with a maximum reported value of 7.5 HZU.

Turbidity in water is caused by the presence of suspended matter such as clay, silt, colloidal particles, plankton and other microscopic organisms. The most important potential health effect of Turbidity is its interference with disinfection in the treatment plant and the maintenance of a chlorine residual. ODWO Maximum Acceptable Concentration for turbidity is 1.0 Formazin Turbidity Units (FTU).

The laboratory turbidity exceeded the Maximum Acceptable Concentration in one treated water sample at 2.3 FTU but this was not confirmed by the more reliable field turbidity result.

METALS

At present, there is no evidence that aluminum is physiologically harmful and no health limit for drinking water has been specified. The measure of aluminum in treated water is important to indicate

the efficiency of the treatment process. The ODWOs indicate that a useful guideline is to maintain a residual below 100 ug/L as aluminum in the water leaving the plant, to avoid problems in the distribution system.

Aluminum exceeded the ODWO Aesthetic or Recommended Operational Guideline of 100 ug/L in 26 of 35 treated and distributed water samples with a maximum reported value of 260.0 ug/L.

The Langelier Index is a measure of the tendency to dissolve or deposit calcium carbonate and has been used as a rough indicator of corrosion potential. Reported values are negative indicating the possibility of leaching of metals from the household plumbing as indicated by the elevated levels of lead, copper and zinc in the distribution system standing samples.

Lead exceeded the ODWO Maximum Acceptable Concentration of 10.0 ug/L in 3 distribution system free flow samples from the same site with a maximum reported value of 51.0 ug/L. The highest level of lead was detected in October while corrosion control was not being practiced at the plant. The District Officer was notified. Sampling personnel should ensure that the taps are adequately flushed before free flow samples are taken.

ORGANIC

CHLOROAROMATICS

Hexachlorocyclopentadiene was found at positive levels in 1 treated sample at 240.0 ng/L. The United States Environmental Protection Agency has an Ambient Water Quality Criteria of 206,000 ng/L for hexachlorocyclopentadiene.

Results of the other parameters in the chloroaromatic scan showed that none were detected above trace levels.

CHLOROPHENOLS

The results of the chlorophenol scan showed that none were detected.

POLYAROMATIC HYDROCARBONS (PAH)

The results of the PAH scan showed that none were detected above trace levels.

PESTICIDES & PCB

The results of the PCB scan showed that none were detected.

The results of the regular pesticide scan showed that none were detected above trace levels.

PHENOLICS

Phenolic compounds are present in the aquatic environment as a result of natural and/or industrial processes. The ODWOs recommend, as an operational guideline, that phenolic substances in drinking water not exceed 2.0 ug/L. This limit has been set primarily to prevent undesirable taste and odours, particularly in chlorinated water. No results exceeded the guideline.

SPECIFIC PESTICIDES

The results of the specific pesticides scan showed that none were detected.

VOLATILES

The detection of benzene, ethylbenzene, toluene and xylenes at low, trace levels may be a laboratory artifact derived from the analytical methodology.

Trihalomethanes (THMs) are produced during the water treatment process and will always occur in chlorinated waters. THMs are comprised of chloroform, chlorodibromomethane and dichlorobromomethane; bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs. Only total THMs results are discussed.

Total THMs were found at positive levels in the 36 treated and distributed water samples analyzed with a maximum level of 180.0 ug/L. This was below the ODWO Maximum Acceptable Concentration of 350 ug/L.

CONCLUSIONS

One health related guideline, lead was exceeded three times in the flushed samples at one distribution system site. The District Officer was notified.

The Fort Frances water treatment plant, for the sample year 1990, produced "adequate" quality water and this was maintained in one of two distribution system sites.

The detection of elevated lead and copper in the standing water samples in the distribution system site indicates that household taps should be flushed before water is used for consumption.

It is important to note that every effort must be made to maintain the equilibrium of the treatment process, which was demonstrated by the October sample, when sodium carbonate was not being added to adjust the pH due to equipment failure.

FIGURE 1

FORT FRANCES WTP

SCHEMATIC DIAGRAM

CHARACTERISTICS

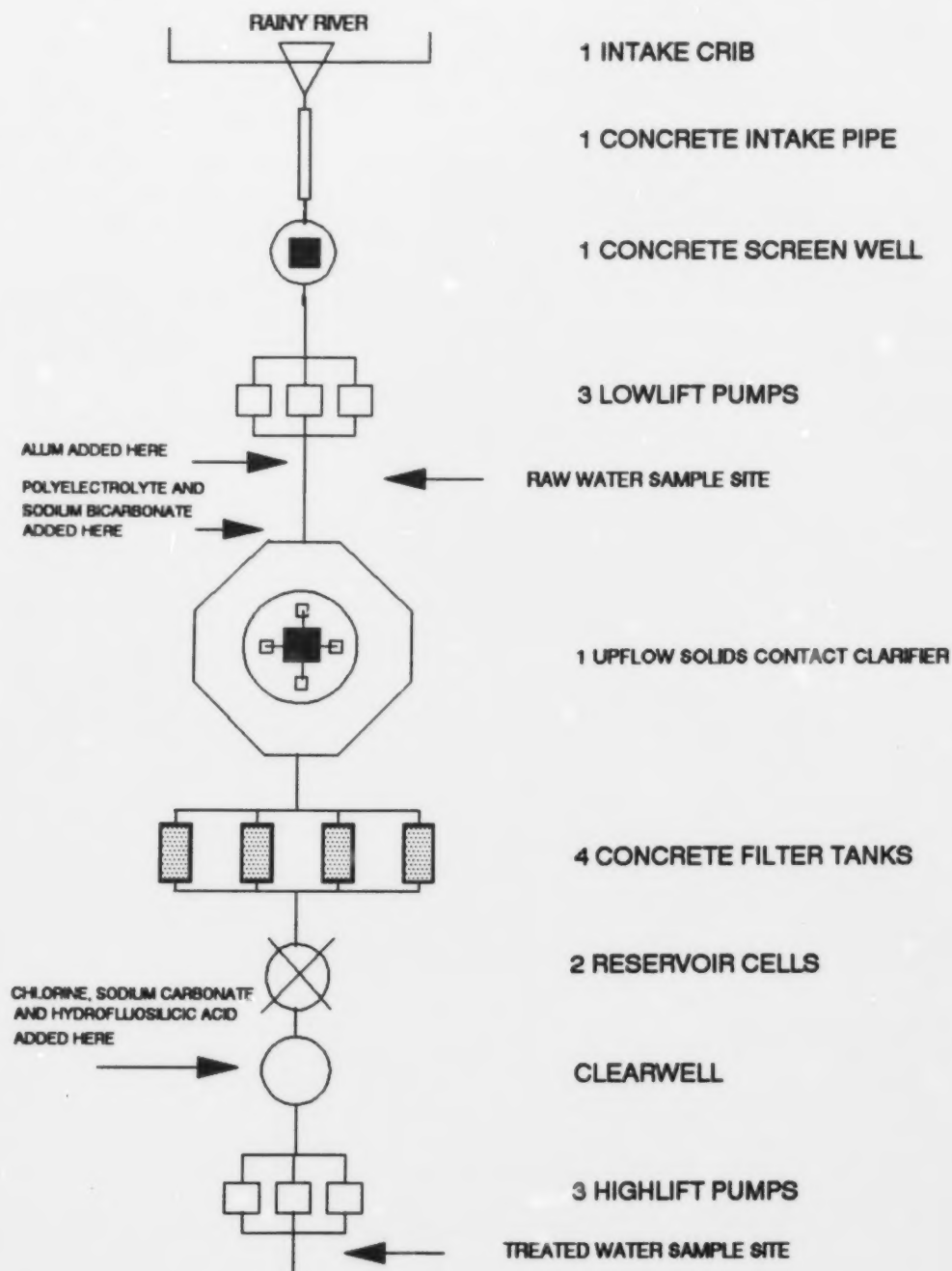


TABLE 1

DRINKING WATER SURVEILLANCE PROGRAM

PLANT GENERAL REPORT

WORKS #: 220000978
PLANT NAME: FORT FRANCES WTP

DISTRICT: KENORA
REGION: NORTH WEST
DISTRICT OFFICER: MR P. FOX

UTM #: 154737505384775

PLANT SUPERINTENDENT: MR RANDY WHITE

ADDRESS: 5TH STREET/WRIGHT AVENUE
FORT FRANCES, ONTARIO
P9A 3M5
(807) 274-9893

MUNICIPALITY: FORT FRANCES
AUTHORITY: MUNICIPAL

PLANT INFORMATION

PLANT VOLUME:	0.000	(x 1000 m3)
DESIGN CAPACITY:	16.900	(x 1000 m3/day)
RATED CAPACITY:	0.000	(x 1000 m3/day)

MUNICIPALITY
FORT FRANCES

POPULATION
8,800

TABLE 2
DRINKING WATER SURVEILLANCE PROGRAM
IN-PLANT MONITORING

PARAMETER -----	LOCATION -----	FREQUENCY -----
ALUMINUM	TREATED WATER	TWICE DAILY
TOTAL CHLORINE RESIDUAL	TREATED WATER	TWICE DAILY
FLUORIDE	TREATED WATER	TWICE DAILY
PH	TREATED WATER	TWICE DAILY
TEMPERATURE	TREATED WATER	CONTINUOUS
TURBIDITY	TREATED WATER	TWICE DAILY

TABLE 3
DRINKING WATER SURVEILLANCE PROGRAM FORT FRANCES WTP SAMPLE DAY CONDITIONS FOR 1990

DATE	DELAY * TIME(HRS)	FLOW (1000M3)	TREATMENT CHEMICAL DOSAGES (MG/L)		POLYELECTROLYTE	CORROSION CONTROL	FLUORIDATION	POST CHLORINATION
			COAGULATION	AID				
			ALUM LIQUID			SODIUM CARBONATE	HYDROFLUOSILICIC ACID	CHLORINE
JAN 23	4.50	5.523	50.00		.50	9.00	1.20	1.10
FEB 27	4.50	5.591	45.00		.50	11.00	1.20	1.00
MAR 28	4.00	5.208	40.00		.50	10.00	1.20	1.20
APR 26	4.50	5.734	40.00		.50	9.00	1.20	1.10
MAY 29	4.00	6.195	40.00		.50	10.00	1.30	1.10
JUN 26	4.50	5.880	40.00		.50	10.00	1.20	1.20
JUL 25	3.00	8.630	44.00		.50	11.00	1.20	1.40
AUG 28	4.00	7.647	42.00		.50	11.00	1.20	1.80
SEP 25	4.00	5.639	40.00		.50	.10		1.20
OCT 23	5.00	6.050	40.00		.50		1.20	1.80
NOV 27	4.20	5.342	36.00		.50	8.00	1.20	1.40
DEC 11	5.50	7.485	41.00		.50	8.00	1.20	1.50

* THE DELAY TIME BETWEEN THE RAW AND TREATED WATER SAMPLING, SHOULD ESTIMATE THE RETENTION TIME.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM FORT FRANCES WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2			SITE 3		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
BACTERIOLOGICAL															
FECAL COLIFORM MF	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.
FECAL COLIFORM	.	.	.	0	0	0	1	0	0	.	.	.	1	0	0
STANDRD PLATE CNT MF	.	.	.	.	.	.	1	0	0	.	.	.	1	1	0
COLIFORM	.	.	.	0	0	0	1	0	0	.	.	.	1	0	0
TOTAL COLIFORM MF	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.
*TOTAL GROUP BACTERIOLOGICAL	0	0	0	0	0	0	3	0	0	0	0	0	3	1	0
CHEMISTRY (FLD)															
FLD CHLORINE (COMB)	.	.	.	11	11	0	24	24	0	2	2	0	24	24	0
FLD CHLORINE FREE	.	.	.	12	12	0	24	24	0	2	2	0	24	24	0
FLD CHLORINE (TOTAL)	.	.	.	12	12	0	24	24	0	2	2	0	24	24	0
FLD PH	12	12	0	11	11	0	23	23	0	2	2	0	24	24	0
FLD TEMPERATURE	12	12	0	12	12	0	24	24	0	2	2	0	24	24	0
FLD TURBIDITY	12	12	0	12	12	0	11	1	0	.	.	.	12	0	0
*TOTAL SCAN CHEMISTRY (FLD)	36	36	0	70	70	0	130	120	0	10	10	0	132	120	0
CHEMISTRY (LAB)															
ALKALINITY	12	12	0	12	12	0	22	22	0	2	2	0	22	22	0
CALCIUM	12	12	0	12	12	0	22	22	0	2	2	0	22	22	0
CYANIDE	12	0	0	12	0	0	.	.	.	.	.	.	.	.	.
CHLORIDE	12	8	4	12	12	0	23	23	0	2	2	0	22	22	0
COLOUR	12	11	1	12	10	2	22	22	0	2	2	0	22	20	0
CONDUCTIVITY	12	12	0	12	12	0	22	22	0	2	2	0	22	22	0
DISS ORG CARBON	12	12	0	12	12	0	23	23	0	2	2	0	22	22	0
FLUORIDE	12	5	7	12	10	2	22	18	4	2	2	0	22	18	4
HARDNESS	12	12	0	12	12	0	22	22	0	2	2	0	22	22	0
IONICAL	12	12	0	12	12	0	24	22	0	2	2	0	24	22	0
LANGELIERS INDEX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MAGNESIUM	12	12	0	12	12	0	22	22	0	2	2	0	22	22	0
SODIUM	12	11	0	12	12	0	22	22	0	2	2	0	22	22	0
AMMONIUM TOTAL	12	4	4	12	3	3	22	8	8	2	1	1	22	5	10
NITRITE	12	2	10	12	2	9	22	4	15	2	0	0	22	5	15
TOTAL NITRATES	12	11	0	12	11	1	22	17	2	2	2	0	22	18	2
NITROGEN TOT KJELD	12	12	0	12	12	0	23	23	0	2	2	0	22	22	0
PH	12	12	0	12	12	0	22	22	0	2	2	0	22	22	0
PHOSPHORUS FIL REACT	12	3	7	12	6	6	.	.	.	.	.	.	.	.	.
PHOSPHORUS TOTAL	12	12	0	12	1	11	.	.	.	.	.	.	.	.	.
SULPHATE	12	12	0	12	12	0	22	22	0	2	2	0	22	22	0
TURBIDITY	12	12	0	12	10	2	22	21	1	2	2	0	22	22	0
*TOTAL SCAN CHEMISTRY (LAB)	252	199	33	252	197	36	401	357	30	36	33	1	398	352	31

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM FORT FRANCES WTP
SUMMARY TABLE OF RESULTS (1990)

SITE PARAMETER	RAW			TREATED			SITE 1			SITE 2			SITE 3		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
METALS															
SILVER	12	0	0	12	0	0	24	0	1	.	.	.	23	0	1
ALUMINUM	12	12	0	12	12	0	24	24	0	.	.	.	23	23	0
ARSENIC	12	0	12	12	0	12	24	0	23	.	.	.	23	0	23
BARIUM	12	12	0	12	12	0	24	24	0	.	.	.	23	23	0
BORON	12	0	12	12	0	12	24	0	24	.	.	.	23	1	22
BERYLLIUM	12	0	1	12	0	1	24	0	0	.	.	.	23	0	2
CADMIUM	12	0	0	12	0	0	24	0	0	.	.	.	23	1	3
COBALT	12	0	12	12	0	12	24	0	21	.	.	.	23	0	20
CHROMIUM	12	0	6	12	0	5	24	0	9	.	.	.	23	0	11
COPPER	12	9	3	12	8	4	24	24	0	.	.	.	23	23	0
IRON	12	12	0	12	0	9	24	0	17	.	.	.	23	11	10
MERCURY	12	0	0	12	0	0	.	.	.	.	.	.	.	.	.
MANGANESE	12	12	0	12	12	0	24	22	1	.	.	.	23	21	0
MOLYBDENUM	12	0	8	12	0	11	24	0	23	.	.	.	23	0	20
NICKEL	12	1	10	12	0	12	24	5	15	.	.	.	23	3	17
LEAD	12	2	10	12	1	10	24	24	0	.	.	.	23	10	11
ANTIMONY	12	1	11	12	0	12	24	4	20	.	.	.	23	6	17
SELENIUM	12	0	0	12	0	0	24	0	1	.	.	.	23	0	1
STRONTIUM	12	12	0	12	12	0	24	24	0	.	.	.	23	23	0
TITANIUM	12	4	8	12	2	10	24	3	21	.	.	.	23	2	21
THALLIUM	12	0	0	12	0	0	24	0	0	.	.	.	23	0	0
URANIUM	12	0	6	12	0	0	24	0	0	.	.	.	23	0	0
VANADIUM	12	1	11	12	0	10	24	0	14	.	.	.	23	0	14
ZINC	12	12	0	12	12	0	24	24	0	.	.	.	23	21	2
*TOTAL SCAN METALS	288	90	110	288	71	120	552	178	190	0	0	0	529	168	195
*TOTAL GROUP INORGANIC & PHYSICAL	576	325	143	610	338	156	1083	655	220	46	43	1	1059	640	226
CHLOROAROMATICS															
HEXACHLOROBUTADIENE	11	0	0	10	0	0	11	0	0	.	.	.	11	0	0
123 TRICHLOROBENZENE	11	0	0	10	0	0	11	0	0	.	.	.	11	0	0
1234 T-CHLOROBENZENE	11	0	0	10	0	0	11	0	0	.	.	.	11	0	0
1235 T-CHLOROBENZENE	11	0	0	10	0	0	11	0	0	.	.	.	11	0	0
124 TRICHLOROBENZENE	11	0	0	10	0	0	11	0	0	.	.	.	11	0	0
1245 T-CHLOROBENZENE	11	0	0	10	0	0	11	0	0	.	.	.	11	0	0
135 TRICHLOROBENZENE	11	0	0	10	0	0	11	0	0	.	.	.	11	0	0
NCB	11	0	0	10	0	0	11	0	0	.	.	.	11	0	0
HEXACHLOROETHANE	11	0	0	10	0	0	11	0	0	.	.	.	11	0	1
OCTACHLOROSTYRENE	11	0	0	10	0	0	11	0	0	.	.	.	11	0	0
PENTACHLOROBENZENE	11	0	0	10	0	0	11	0	0	.	.	.	11	0	0
236 TRICHLOROTOLUENE	11	0	0	10	0	0	11	0	0	.	.	.	11	0	0
245 TRICHLOROTOLUENE	11	0	0	10	0	0	11	0	1	.	.	.	11	0	0
26A TRICHLOROTOLUENE	11	0	0	10	0	0	11	0	0	.	.	.	11	0	0
*TOTAL SCAN CHLOROAROMATICS	154	0	0	140	0	0	154	0	1	0	0	0	154	0	1
CHLOROPHENOLS															

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM FORT FRANCES WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	SITE			RAW			TREATED			SITE 1			SITE 2			SITE 3		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
234 TRICHLOROPHENOL	2	0	0	1	0	0	.	.	.	.	.	.	.	.	.	.	.	.
2345 T-CHLOROPHENOL	2	0	0	1	0	0	.	.	.	.	.	.	.	.	.	.	.	.
2356 T-CHLOROPHENOL	2	0	0	1	0	0	.	.	.	.	.	.	.	.	.	.	.	.
245-TRICHLOROPHENOL	2	0	0	1	0	0	.	.	.	.	.	.	.	.	.	.	.	.
246-TRICHLOROPHENOL	2	0	0	1	0	0	.	.	.	.	.	.	.	.	.	.	.	.
PENTACHLOROPHENOL	2	0	0	1	0	0	.	.	.	.	.	.	.	.	.	.	.	.
*TOTAL SCAN CHLOROPHENOLS	12	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PAH																		
PHENANTHRENE	11	0	0	11	0	0	1	0	1	.	.	.	1	0	0	0	0	0
ANTHRACENE	11	0	0	11	0	0	1	0	0	.	.	.	1	0	0	0	0	0
FLUORANTHENE	11	0	0	11	0	0	1	0	0	.	.	.	1	0	0	0	0	0
PYRENE	11	0	0	11	0	0	1	0	0	.	.	.	1	0	0	0	0	0
BENZO(A)ANTHRACENE	11	0	0	11	0	0	1	0	0	.	.	.	1	0	0	0	0	0
CHRYSENE	11	0	0	11	0	0	1	0	0	.	.	.	1	0	0	0	0	0
DIMETH. BENZ(A)ANTHR	10	0	0	10	0	0	1	0	0	.	.	.	1	0	0	0	0	0
BENZO(E) PYRENE	11	0	0	11	0	0	1	0	0	.	.	.	1	0	0	0	0	0
BENZO(B) FLUORANTHEN	11	0	0	11	0	0	1	0	0	.	.	.	1	0	0	0	0	0
PERYLENE	11	0	0	11	0	0	1	0	0	.	.	.	1	0	0	0	0	0
BENZO(K) FLUORANTHEN	11	0	0	11	0	0	1	0	0	.	.	.	1	0	0	0	0	0
BENZO(A) PYRENE	11	0	0	11	0	0	1	0	0	.	.	.	1	0	0	0	0	0
BENZO(G,H,I) PERYLEN	11	0	0	11	0	0	1	0	0	.	.	.	1	0	0	0	0	0
DIBENZO(A,H) ANTHRAC	11	0	0	11	0	0	1	0	0	.	.	.	1	0	0	0	0	0
INDENO(1,2,3-C,D) PY	11	0	0	11	0	0	1	0	0	.	.	.	1	0	0	0	0	0
BENZO(B) CHRYSENE	11	0	0	11	0	0	1	0	0	.	.	.	1	0	0	0	0	0
CORONENE	11	0	0	11	0	0	1	0	0	.	.	.	1	0	0	0	0	0
*TOTAL SCAN PAH	186	0	0	186	0	0	17	0	1	0	0	0	17	0	0	0	0	0
PESTICIDES & PCB																		
ALDRIN	11	0	0	10	0	0	11	0	0	.	.	.	11	0	0	0	0	0
ALPHA BHC	11	0	6	10	0	5	11	0	8	.	.	.	11	0	7	0	0	0
BETA BHC	11	0	0	10	0	0	11	0	0	.	.	.	11	0	0	0	0	0
LINDANE	11	0	0	10	0	0	11	0	0	.	.	.	11	0	0	0	0	0
ALPHA CHLORDANE	11	0	0	10	0	0	11	0	0	.	.	.	11	0	0	0	0	0
GAMMA CHLORDANE	11	0	0	10	0	0	11	0	0	.	.	.	11	0	0	0	0	0
DIELDRIN	11	0	0	10	0	0	11	0	0	.	.	.	11	0	0	0	0	0
METHOXYCHLOR	11	0	0	10	0	0	11	0	0	.	.	.	11	0	0	0	0	0
ENDOSULFAN I	11	0	0	10	0	0	11	0	0	.	.	.	11	0	0	0	0	0
ENDOSULFAN II	11	0	0	10	0	0	11	0	0	.	.	.	11	0	0	0	0	0
ENDRIN	11	0	0	10	0	0	11	0	0	.	.	.	11	0	0	0	0	0
ENDOSULFAN SULPHATE	11	0	0	10	0	0	11	0	0	.	.	.	11	0	0	0	0	0
HEPTACHLOR EPOXIDE	11	0	0	10	0	0	11	0	0	.	.	.	11	0	0	0	0	0
HEPTACHLOR	11	0	0	10	0	0	11	0	0	.	.	.	11	0	0	0	0	0
MIREX	11	0	0	10	0	0	11	0	0	.	.	.	11	0	0	0	0	0
OXYCHLORDANE	11	0	0	10	0	0	11	0	0	.	.	.	11	0	0	0	0	0
OPDOT	11	0	0	10	0	0	11	0	0	.	.	.	11	0	0	0	0	0
PCB	11	0	0	10	0	0	11	0	0	.	.	.	11	0	0	0	0	0
DDD	11	0	0	10	0	0	11	0	0	.	.	.	11	0	0	0	0	0
PPODE	11	0	0	10	0	0	11	0	0	.	.	.	11	0	0	0	0	0

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM FORT FRANCES WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	SITE			RAW			TREATED			SITE 1			SITE 2			SITE 3		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
PPDDT	11	0	0	10	0	0	11	0	0	.	.	.	11	0	0	.	.	.
AMETRINE	12	0	0	10	0	0	.	.	.	.	.	.	.	.	.	.	.	.
ATRAZINE	12	0	0	10	0	0	.	.	.	.	.	.	.	.	.	.	.	.
ATRATONE	12	0	0	10	0	0	.	.	.	.	.	.	.	.	.	.	.	.
CYANAZINE (BLADEx)	12	0	0	10	0	0	.	.	.	.	.	.	.	.	.	.	.	.
DESETHYLATRAZINE	12	0	0	10	0	0	.	.	.	.	.	.	.	.	.	.	.	.
D-ETHYL SIMAZINE	12	0	0	10	0	0	.	.	.	.	.	.	.	.	.	.	.	.
PROMETONE	12	0	0	10	0	0	.	.	.	.	.	.	.	.	.	.	.	.
PROPACINE	12	0	0	10	0	0	.	.	.	.	.	.	.	.	.	.	.	.
PROMETRYNE	12	0	0	10	0	0	.	.	.	.	.	.	.	.	.	.	.	.
METRIBUZIN (SENCOR)	11	0	0	9	0	0	.	.	.	.	.	.	.	.	.	.	.	.
SIMAZINE	12	0	0	10	0	0	.	.	.	.	.	.	.	.	.	.	.	.
ALACHLOR (LASSO)	12	0	0	10	0	0	.	.	.	.	.	.	.	.	.	.	.	.
METOLACHLOR	12	0	0	10	0	0	.	.	.	.	.	.	.	.	.	.	.	.
HEXACLYCLOPENTADIEN	3	0	0	3	1	0	3	0	1	.	.	.	3	0	1	.	.	.
*TOTAL SCAN PESTICIDES & PCB	389	0	6	342	1	5	234	0	9	0	0	0	234	0	8	.	.	.

PHENOLICS																		
PHENOLICS	12	3	5	11	4	4	.	.	.	.	.	.	.	.	.	.	.	.
*TOTAL SCAN PHENOLICS	12	3	5	11	4	4	0	0	0	0	0	0	0	0	0	0	0	0

SPECIFIC PESTICIDES																		
TOXAPHENE	11	0	0	10	0	0	11	0	0	.	.	.	11	0	0	.	.	.
2,4,5-T	2	0	0	1	0	0	.	.	.	.	.	.	.	.	.	.	.	.
2,4-D	2	0	0	1	0	0	.	.	.	.	.	.	.	.	.	.	.	.
2,4-DB	2	0	0	1	0	0	.	.	.	.	.	.	.	.	.	.	.	.
2,4 D PROPIONIC ACID	2	0	0	1	0	0	.	.	.	.	.	.	.	.	.	.	.	.
DICAMBA	2	0	0	1	0	0	.	.	.	.	.	.	.	.	.	.	.	.
PICHLORAM	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.
SILVEX	2	0	0	1	0	0	.	.	.	.	.	.	.	.	.	.	.	.
DIAZINON	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.	.	.	.
DICHLOROVOS	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.	.	.	.
CHLORPYRIFOS	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.	.	.	.
ETHION	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.	.	.	.
AZINPHOS-METHYL	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.
MALATHION	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.	.	.	.
MEVINPHOS	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.	.	.	.
METHYL PARATHION	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.	.	.	.
METHYLTRITHION	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.	.	.	.
PARATHION	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.	.	.	.
PHORATE	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.	.	.	.
RELDAN	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.	.	.	.
RONNEL	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.	.	.	.
AMINOCARB	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.
BENOMYL	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.
BUX	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.
CARBOFURAN	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.	.	.	.
CICP	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.	.	.	.
DIALATE	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM FORT FRANCES WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	SITE			RAW			TREATED			SITE 1			SITE 2			SITE 3		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
EPTAM	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.	.	.	.
IPC	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.	.	.	.
PROPOXUR	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.	.	.	.
CARBARYL	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.	.	.	.
BUTYLATE	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.	.	.	.
*TOTAL SCAN SPECIFIC PESTICIDES	63	0	0	56	0	0	11	0	0	0	0	0	0	0	11	0	0	0
VOLATILES																		
BENZENE	12	0	0	11	0	3	12	0	4	1	0	0	12	0	2	0	0	0
TOLUENE	12	0	0	11	0	2	12	0	3	1	0	0	12	0	0	0	0	0
ETHYLBENZENE	12	0	1	11	0	8	12	0	8	1	0	1	12	0	6	0	0	0
P-XYLENE	12	0	0	11	0	0	12	0	0	1	0	0	12	0	0	0	0	0
M-XYLENE	12	0	0	11	0	2	12	0	4	1	0	1	12	0	4	0	0	0
O-XYLENE	12	0	0	11	0	3	12	0	4	1	0	1	12	0	4	0	0	0
STYRENE	12	0	1	11	0	7	12	0	7	1	0	0	12	0	4	0	0	0
1,1 DICHLOROETHYLENE	12	0	0	11	0	0	12	0	0	1	0	0	12	0	0	0	0	0
METHYLENE CHLORIDE	12	0	0	11	0	0	12	0	0	1	0	0	12	0	0	0	0	0
1,1,2 DICHLOROETHYLENE	12	0	0	11	0	0	12	0	1	1	0	0	12	0	0	0	0	0
1,1 DICHLOROETHANE	12	0	0	11	0	0	12	0	0	1	0	0	12	0	0	0	0	0
CHLOROFORM	12	0	0	11	11	0	12	12	0	1	1	0	12	12	0	0	0	0
111, TRICHLOROETHANE	12	0	2	11	0	0	12	0	1	1	0	0	12	0	0	0	0	0
1,2 DICHLOROETHANE	12	0	0	11	0	0	12	0	0	1	0	0	12	0	0	0	0	0
CARBON TETRACHLORIDE	12	0	0	11	0	0	12	0	0	1	0	0	12	0	0	0	0	0
1,2 DICHLOROPROPANE	12	0	0	11	0	0	12	0	0	1	0	0	12	0	0	0	0	0
TRICHLOROETHYLENE	12	0	0	11	0	0	12	0	0	1	0	0	12	0	0	0	0	0
DICHLOROBROMOMETHANE	12	0	0	11	11	0	12	12	0	1	1	0	12	12	0	0	0	0
112 TRICHLOROETHANE	12	0	0	11	0	0	12	0	0	1	0	0	12	0	0	0	0	0
CHLORODIBROMOMETHANE	12	0	0	11	0	1	12	0	1	1	0	0	12	0	1	0	0	0
T-CHLOROETHYLENE	12	0	0	11	0	0	12	0	0	1	0	0	12	0	1	0	0	0
BROMOFORM	12	0	0	11	0	0	12	0	0	1	0	0	12	0	0	0	0	0
1122 T-CHLOROETHANE	12	0	0	11	0	0	12	0	0	1	0	0	12	0	0	0	0	0
CHLOROBENZENE	12	0	0	11	0	0	12	0	0	1	0	0	12	0	0	0	0	0
1,4 DICHLOROBENZENE	12	0	2	11	0	0	12	0	0	1	0	0	12	0	0	0	0	0
1,3 DICHLOROBENZENE	12	0	0	11	0	0	12	0	0	1	0	0	12	0	0	0	0	0
1,2 DICHLOROBENZENE	12	0	0	11	0	0	12	0	0	1	0	0	12	0	0	0	0	0
ETHYLENE DIBROMIDE	12	0	0	11	0	0	12	0	0	1	0	0	12	0	0	0	0	0
TOTL TRIHALOMETHANES	12	0	0	11	11	0	12	12	0	1	1	0	12	12	0	0	0	0
*TOTAL SCAN VOLATILES	348	0	6	319	33	26	348	36	33	29	3	3	348	36	22	0	0	0
*TOTAL GROUP ORGANIC	1164	3	17	1060	38	35	764	36	44	29	3	3	764	36	31	0	0	0

KEY TO TABLE 5 and 6

- A ONTARIO DRINKING WATER OBJECTIVES (ODWO)
1. Maximum Acceptable Concentration (MAC)
1+. MAC for Total Trihalomethanes
2. Interim Maximum Acceptable Concentration (IMAC)
3. Aesthetic Objective (AO)
3+. AO for Total Xylenes
4. Recommended Operational Guideline
- B HEALTH & WELFARE CANADA (H&W)
1. Maximum Acceptable Concentration (MAC)
2. Proposed MAC
3. interim MAC
4. Aesthetic Objective (AO)
- C WORLD HEALTH ORGANIZATION (WHO)
1. Guideline Value (GV)
2. Tentative GV
3. Aesthetic GV
- D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
1. Maximum Contaminant Level (MCL)
2. Suggested No-Adverse Effect Level (SNAEL)
3. Lifetime Health Advisory
4. EPA Ambient Water Quality Criteria
4T. EPA Ambient Water Quality Criteria for Total PAH
- F EUROPEAN ECONOMIC COMMUNITY (EEC)
1. Health Related Guideline Level
2. Aesthetic Guideline Level
3. Maximum Admissible Concentration (MADC)
- G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE
- I NEW YORK STATE AMBIENT WATER GUIDELINE
- N/A NONE AVAILABLE

LABORATORY RESULTS, REMARK DESCRIPTIONS

.	No Sample Taken
BDL	Below Minimum Measurement Amount
<T	Greater Than Detection Limit But Not Confident (SEE INTERPRETATION OF RESULTS ABOVE)
>	Results Are Greater Than The Upper Limit
<=	Approximate Result
ICS	No Data: Contamination Suspected
IIL	No Data: Sample Incorrectly Labelled
IIS	No Data: Insufficient Sample
IIV	No Data: Inverted Septum
ILA	No Data: Laboratory Accident
ILD	No Data: Test Queued After Sample Discarded
INA	No Data: No Authorization To Perform Reanalysis
INP	No Data: No Procedure
INR	No Data: Sample Not Received
IOP	No Data: Obscured Plate
IOU	No Data: Quality Control Unacceptable
IPE	No Data: Procedural Error - Sample Discarded
IPH	No Data: Sample pH Outside Valid Range
IRE	No Data: Received Empty
IRO	No Data: See Attached Report (no numeric results)
ISM	No Data: Sample Missing
ISS	No Data: Send Separate Sample Properly Preserved
IUI	No Data: Indeterminant Interference
ITX	No Data: Time Expired
A3C	Approximate, Total Count Exceeded 300 Colonies
APL	Additional Peak, Large, Not Priority Pollutant
APS	Additional Peak, Less Than, Not Priority Pollutant
CIC	Possible Contamination, Improper Cap
CRO	Calculated Result Only
PPS	Test Performed On Preserved Sample
RMP	P and M-Xylene Not Separated
RRV	Rerun Verification
RVU	Reported Value Unusual
SPS	Several Peaks, Small, Not Priority Pollutant

UCR	Unreliable: Could Not Confirm By Reanalysis
UCS	Unreliable: Contamination Suspected
UIN	Unreliable: Indeterminate Interference
XP	Positive After X Number Of Hours
T#	(T06) Result Taken After # Hours

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT FRANCES WTP 1990
DISTRIBUTION SYSTEM

WATER TREATMENT PLANT

RAW	TREATED	SITE 1		SITE 2		SITE 3	
		STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
BACTERIOLOGICAL							
FECAL COLIFORM ()		DET'N LIMIT = 0	GUIDELINE = 0 (A1)				
DEC	IUN	.	0	.	.	.	0
STANDARD PLATE CNT MF (COUNTS/ML)		DET'N LIMIT = 0	GUIDELINE = 500/ML (A3)				
DEC	.	.	0	.	.	.	1
COLIFORM (CNT/100ML)		DET'N LIMIT = 0	GUIDELINE = N/A				
DEC	IUN	.	0	.	.	.	0

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT FRANCES WTP 1990

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM					
SITE TYPE	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (FLD)			GUIDELINE = N/A					
FLD CHLORINE (CONC) (MG/L)			DET'N LIMIT = 0					
JAN	.	.200	.500	.400	.400	.300	.400	.300
FEB	.	.300	.300	.400	.	.	.200	.200
MAR	.	.410	.200	.300	.	.	.200	.200
APR	.	.090	.020	.040	.	.	.040	.020
MAY	.	.100	.200	.200	.	.	.200	.200
JUN	.	.140	.200	.300	.	.	.100	.100
JUL	.	.350	.200	.200	.	.	.200	.200
AUG	.	.	.300	.300	.	.	.200	.200
SEP	.	.200	.300	.200	.	.	.200	.200
OCT	.	.270	.200	.300	.	.	.200	.200
NOV	.	.270	.400	.300	.	.	.300	.400
DEC	.	.250	.200	.200	.	.	.200	.200
FLD CHLORINE FREE (MG/L)			GUIDELINE = N/A					
JAN	.	.900	.100	.300	.100	.300	.100	.300
FEB	.	.800	.300	.500	.	.	.100	.200
MAR	.	.780	.100	.500	.	.	.100	.200
APR	.	.900	.010	.050	.	.	.030	.070
MAY	.	.740	.100	.300	.	.	.100	.200
JUN	.	1.000	.100	.600	.	.	.100	.200
JUL	.	1.060	.100	.300	.	.	.100	.200
AUG	.	.710	.100	.300	.	.	.100	.300
SEP	.	.790	.300	.500	.	.	.300	.500
OCT	.	1.270	.100	.400	.	.	.400	.200
NOV	.	.980	.100	.700	.	.	.200	.300
DEC	.	1.080	.100	.500	.	.	.100	.300
FLD CHLORINE (TOTAL) (MG/L)			GUIDELINE = N/A					
JAN	.	1.100	.600	.700	.500	.600	.500	.600
FEB	.	1.100	.600	.900	.	.	.300	.400
MAR	.	1.190	.300	.800	.	.	.300	.400
APR	.	1.090	.030	.090	.	.	.070	.090
MAY	.	.840	.300	.500	.	.	.300	.400
JUN	.	1.140	.300	.900	.	.	.200	.300
JUL	.	1.410	.300	.500	.	.	.300	.400
AUG	.	.710	.400	.600	.	.	.300	.500
SEP	.	.990	.600	.700	.	.	.500	.700
OCT	.	1.540	.300	.700	.	.	.600	.400
NOV	.	1.250	.500	1.000	.	.	.500	.700
DEC	.	1.330	.300	.700	.	.	.300	.500

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT FRANCES WTP 1990

DISTRIBUTION SYSTEM

WATER TREATMENT PLANT

SITE TYPE	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
FLD PH (DNMSLESS)			DET'N LIMIT = N/A		GUIDELINE = 6.5-8.5(A4)			
JAN	7.500	7.900	7.400	7.600	7.500	7.600	7.500	7.600
FEB	7.710	8.000	7.690	7.800			7.400	7.200
MAR	7.390	7.840	7.500	7.300			7.200	7.200
APR	7.280		7.500	7.500			7.300	7.500
MAY	7.490	7.190	7.400				7.300	7.400
JUN	7.060	7.960	7.500	7.500			7.400	7.400
JUL	7.000	6.990	7.100	7.100			7.200	7.200
AUG	7.160	7.550	7.500	7.500			7.200	7.100
SEP	7.390	7.690	7.500	7.300			7.400	7.600
OCT	7.030	5.960	6.800	6.800			6.800	6.800
NOV	7.240	7.700	7.700	7.700			7.300	7.300
DEC	7.400	7.550	7.300	7.500			7.500	7.500
FLD TEMPERATURE (DEG.C)			DET'N LIMIT = N/A		GUIDELINE = 15 (A3)			
JAN	4.000	4.200	11.000	2.800	5.000	3.000	5.000	3.000
FEB	6.000	6.500	14.000	6.500			9.500	7.000
MAR	8.400	4.400	10.000	4.500			9.000	5.000
APR	7.500	7.700	12.500	7.500			11.000	2.000
MAY	17.000	16.000	16.500	13.000			13.500	11.000
JUN	18.000	20.000	18.500	15.000			18.000	15.500
JUL	21.900	21.300	22.000	18.500			20.000	18.500
AUG	23.400	21.900	19.500	18.000			19.000	18.000
SEP	17.500	16.500	19.000	17.000			18.000	17.000
OCT	11.300	9.400	18.000	10.500			11.500	9.000
NOV	5.000	5.200	8.500	6.500			8.500	6.500
DEC	6.000	4.400	13.500	7.000			7.500	1.500
FLD TURBIDITY (FTU)			DET'N LIMIT = N/A		GUIDELINE = 1 (A1)			
JAN	.790	.110		.270				
FEB	.670	.180						
MAR	.860	.100		.000				
APR	1.290	.090	.000	.000			.000	.000
MAY	2.100	.220	.000	.000			.000	.000
JUN	2.000	.180						
JUL	1.680	.120						
AUG	2.700	.110						
SEP	3.400	.160		.000			.000	.000
OCT	3.100	.100	.000	.000			.000	.000
NOV	2.300	.190	.000	.000			.000	.000
DEC	1.750	.160	.000	.000			.000	.000

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT FRANCES WTP 1990

WATER TREATMENT PLANT DISTRIBUTION SYSTEM

SITE TYPE	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (LAB)								
ALKALINITY (MG/L)			DET'N LIMIT = 0.2		GUIDELINE = 30-50 (A3)			
JAN	20.000	40.000	38.200	40.000	38.200	38.100	38.200	38.100
FEB	22.200	34.300	37.100	11S			35.800	34.000
MAR	20.500	37.300	11S	34.400			35.800	
APR	18.900	37.300	36.500	35.000			35.500	35.200
MAY	20.400	22.100	32.200	32.000			27.300	26.600
JUN	20.100	44.500	37.900	40.600			35.300	32.100
JUL	15.100	19.400	25.300	22.400			23.300	26.800
AUG	19.900	32.000	31.000	31.100			31.300	27.100
SEP	20.300	33.100	33.200	33.600			33.900	31.200
OCT	19.600	2.200	7.400	5.300			4.000	
NOV	17.800	35.000	33.700	33.600			33.200	33.700
DEC	20.400	31.500	31.600	31.300			31.300	33.400
CALCIUM (MG/L)			DET'N LIMIT = 0.2		GUIDELINE = 100 (F2)			
JAN	6.500	6.500	6.800	6.200	5.800	6.100	5.800	6.100
FEB	6.800	6.700	7.000	11S			7.300	7.100
MAR	6.800	7.000	11S	7.200			7.200	
APR	7.100	6.600	6.600	6.800			7.000	6.800
MAY	6.600	6.600	6.100	6.300			6.500	6.000
JUN	8.000	6.800	6.800	6.400			7.200	6.600
JUL	6.800	6.600	6.600	7.000			6.400	6.400
AUG	6.000	6.000	5.500	5.600			6.400	5.400
SEP	7.600	7.200	7.000	7.000			7.200	7.200
OCT	6.000	6.400	6.900	6.200			6.400	
NOV	7.200	7.100	7.000	7.000			7.000	7.000
DEC	8.000	8.000	8.000	8.400			8.600	8.000
CHLORIDE (MG/L)			DET'N LIMIT = 0.2		GUIDELINE = 250 (A3)			
JAN	1.100	2.700	3.000	2.700	3.300	2.700	3.300	2.700
FEB	1.100	2.600	3.200	2.900			3.600	2.800
MAR	1.100	2.900	11S	2.700			2.700	
APR	.900 <T	2.600	2.800	2.600			2.600	2.600
MAY	1.200	3.500	3.600	3.200			3.600	3.200
JUN	.500 <T	4.000	4.000	4.100			4.100	3.800
JUL	1.000	3.100	3.500	3.200			3.400	3.200
AUG	1.300	3.000	3.200	2.800			3.100	2.900
SEP	.900 <T	3.200	3.100	2.900			3.300	2.900
OCT	.900 <T	2.500	2.900	2.700			2.700	2.900
NOV	1.300	2.800	2.900	2.800			3.200	2.900
DEC	1.000	2.900	2.300	2.400			2.600	2.700

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT FRANCES WTP 1990

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM					
SITE TYPE	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
COLOUR (NZU)			DET'N LIMIT = 0.5		GUIDELINE = 5 (A3)			
JAN	38,500	3,500	4,000	3,500	4,500	3,500	4,500	3,500
FEB	41,500	3,000	3,000	115			9,500	7,000
MAR	37,000	4,000	115	4,000			4,500	
APR	39,500	3,000	3,500	3,000			3,500	3,000
MAY	41,500	5,000	5,000	4,500			6,000	4,500
JUN	38,000	4,000	3,500	4,500			5,000	3,500
JUL	39,500	3,000	3,000	3,500			5,500	3,500
AUG	2,000 <T	2,000 <T	3,500	2,500			BDL	BDL
SEP	28,500	3,500	3,500	4,000			5,500	4,500
OCT	30,000	2,000 <T	3,000	3,000			3,000	4,000
NOV	33,500	4,000	4,500	4,500			4,000	4,000
DEC	33,000	7,500	5,000	4,500			10,000	3,500
CONDUCTIVITY (UMHO/CM)			DET'N LIMIT = 1.		GUIDELINE = 400 (F2)			
JAN	54	139	137	141	141	138	141	138
FEB	53	128	137	115			135	129
MAR	54	129	115	123			127	
APR	50	133	132	129			130	129
MAY	52	105	126	124			112	110
JUN	53	148	135	141			132	126
JUL	51	105	115	109			112	116
AUG	53	122	122	121			123	114
SEP	54	116	119	119			123	117
OCT	53	72	75	74			72	
NOV	54	123	124	123			123	124
DEC	54	117	116	116			117	122
DISS ORG CARBON (MG/L)			DET'N LIMIT = .100		GUIDELINE = 5.0 (A3)			
JAN	8,900	4,000	3,900	3,900	4,500	3,900	4,500	3,900
FEB	8,900	3,700	3,700	4,100			4,400	3,800
MAR	8,500	4,600	115	4,400			4,400	
APR	8,700	3,800	3,800	3,800			3,700	3,700
MAY	4,800	4,400	4,300	4,200			4,500	4,400
JUN	8,500	4,600	4,400	4,500			4,300	4,300
JUL	8,800	4,000	4,000	3,800			4,000	3,900
AUG	8,100	3,700	3,400	3,500			3,800	3,700
SEP	8,100	4,700	4,800	4,700			4,900	4,600
OCT	7,800	3,700	3,300	3,400			3,800	
NOV	8,200	4,400	4,400	4,500			4,300	4,400
DEC	8,100	4,900	4,400	4,400			4,400	4,200

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT FRANCES WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

SITE TYPE	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
FLUORIDE (MG/L)								
			DET'N LIMIT = 0.01		GUIDELINE = 1.5 (A1)			
JAN	.060	.920	.940	1.000	1.000	.960	1.000	.960
FEB	.040 <T	.840	1.000	1.15	1.000		.940	.920
MAR	.060	.880	1.15	.860			.880	
APR	.040 <T	.920	.960	.960			.960	.960
MAY	.040 <T	1.140	1.280	1.220			1.000	1.000
JUN	.040 <T	1.440	1.380	1.460			1.320	1.320
JUL	.060	1.220	1.240	1.220			1.300	1.320
AUG	.020 <T	.040 <T	.040 <T	.040 <T			1.280	1.160
SEP	.040 <T	.020 <T	.020 <T	.020 <T			.040 <T	.020 <T
OCT	.060	1.460	.780	1.060			.020 <T	.020 <T
NOV	.060	1.220	1.300	1.300			1.080	
DEC	.040 <T	1.140	.960	.960			1.160	1.260
			DET'N LIMIT = 0.5		GUIDELINE = 80-100 (A4)		1.000	
HARDNESS (MG/L)								
JAN	24.100	23.900	25.000	22.700	22.200	23.000	22.200	23.000
FEB	25.000	24.700	25.500	1.15			26.400	25.800
MAR	24.000	25.000	1.15	26.000			26.000	
APR	26.500	25.000	25.000	25.000			26.000	25.000
MAY	24.300	24.300	23.100	23.600			24.300	22.700
JUN	27.800	25.000	24.000	23.000			26.000	24.000
JUL	24.000	24.000	23.000	25.000			24.000	24.000
AUG	23.000	23.000	22.000	22.000			26.000	22.000
SEP	27.000	26.000	26.000	26.000			26.000	26.000
OCT	23.300	24.400	25.900	23.900			24.700	
NOV	27.100	27.100	26.200	26.700			26.800	26.600
DEC	29.000	29.000	29.000	30.000			31.000	29.000
IONICAL (MG/LESS)								
			DET'N LIMIT = N/A		GUIDELINE = N/A			
JAN	5.169	4.493	4.279	4.907	4.846	3.816	4.846	3.816
FEB	3.360	2.926	3.569	.000			5.136	5.498
MAR	5.547	5.203	.000	4.334			3.690	.000
APR	20.190	6.039	5.861	5.769			6.994	5.988
MAY	7.455	6.693	5.084	4.596			4.097	3.464
JUN	24.680	7.396	6.800	3.393			.115	4.273
JUL	37.470	11.200	5.989	10.420			7.419	5.993
AUG	7.396	.764	4.733	1.874			.130	1.888
SEP	22.150	4.268	3.896	6.748			4.025	5.583
OCT	6.216	9.221	8.908	10.990			2.028	.000
NOV	28.160	9.338	8.065	10.270			8.129	9.450
DEC	27.100	12.310	14.430	15.970			17.350	14.880

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT FRANCES WTP 1990

WATER TREATMENT PLANT		DISTRIBUTION SYSTEM					
SITE	RAW	TREATED	SITE 1		SITE 2		SITE 3
TYPE			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING
LANGELIERS INDEX (DMH/SS)			DET'N LIMIT = N/A		GUIDELINE = N/A		
JAN	-1.633	-1.100	-1.160	-1.102	-1.181	-1.168	-1.181
FEB	-1.717	-1.329	-1.240	-1.234	-	-	-1.236
MAR	-1.672	-1.044	-	-1.174	-	-	-1.129
APR	-1.647	-1.111	-1.180	-1.524	-	-	-1.186
MAY	-1.746	-1.946	-1.556	-1.061	-	-	-1.604
JUN	-1.570	-0.938	-1.102	-1.896	-	-	-997
JUL	-1.874	-2.132	-1.782	-1.386	-	-	-1.819
AUG	-1.879	-1.324	-1.446	-1.195	-	-	-1.236
SEP	-1.688	-1.128	-1.270	-3.619	-	-	-1.080
OCT	-1.806	-4.906	-3.118	-1.226	-	-	-3.817
NOV	-1.689	-1.173	-1.226	-1.175	-	-	-1.206
DEC	-1.544	-1.294	-1.182	-	-	-	-1.121
MAGNESIUM (MG/L)			DET'N LIMIT = 0.1		GUIDELINE = 30 (F2)		
JAN	1.900	1.850	1.950	1.800	1.900	1.900	1.900
FEB	1.950	1.950	1.950	1.15	-	-	1.950
MAR	1.900	1.800	1.15	1.900	-	-	1.900
APR	2.000	2.000	2.100	2.000	-	-	2.000
MAY	1.900	1.900	1.900	1.900	-	-	1.900
JUN	1.900	1.900	1.800	1.700	-	-	1.900
JUL	1.800	1.800	1.700	1.800	-	-	1.900
AUG	2.000	2.000	2.000	1.900	-	-	1.900
SEP	2.100	2.100	2.000	2.000	-	-	2.000
OCT	2.050	2.050	2.150	2.050	-	-	2.100
NOV	2.200	2.250	2.100	2.250	-	-	2.250
DEC	2.200	2.200	2.200	2.300	-	-	2.200
SODIUM (MG/L)			DET'N LIMIT = 0.2		GUIDELINE = 200 (M4)		
JAN	BDL	17.500	16.600	17.900	17.900	17.400	17.400
FEB	1.600	16.900	18.700	115	-	-	17.300
MAR	1.400	17.800	115	15.400	-	-	-
APR	1.200	18.600	18.000	17.200	-	-	17.400
MAY	1.400	11.600	17.300	16.300	-	-	13.100
JUN	1.400	22.600	19.200	20.200	-	-	16.000
JUL	1.200	11.200	13.600	12.200	-	-	13.800
AUG	1.400	15.600	15.100	15.400	-	-	13.800
SEP	1.400	14.400	14.800	15.000	-	-	13.800
OCT	1.400	1.500	1.400	1.300	-	-	14.200
NOV	1.300	16.000	15.700	15.900	-	-	15.800
DEC	1.400	14.200	14.200	14.000	-	-	15.600

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT FRANCES WTP 1990
DISTRIBUTION SYSTEM

WATER TREATMENT PLANT

SITE TYPE	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
AMMONIUM TOTAL (MG/L)			DET'N LIMIT = 0.002		GUIDELINE = 0.05 (F2)			
JAN	BOL	BOL	BOL	.012	.074	.008 <T	.074	.008 <T
FEB	BOL	BOL	.008 <T	115			.006 <T	BOL
MAR	BOL	BOL	115	.002 <T			BOL	BOL
APR	.002 <T	BOL	BOL	BOL			BOL	BOL
MAY	.026	BOL	BOL	BOL			.006 <T	BOL
JUN	.010	BOL	.004 <T	BOL			.002 <T	BOL
JUL	.036	.014	.012	.006 <T			.018	.008 <T
AUG	.002 <T	.006 <T	.010	.008 <T			.020	.010
SEP	BOL	.004 <T	.002 <T	.006 <T			.006 <T	BOL
OCT	.014	.008 <T	.018	.012			.012	.008 <T
NOV	.002 <T	.010	.012	.010			.004 <T	.008 <T
DEC	.002 <T	.012	.012	.006 <T			.006 <T	.008 <T
NITRITE (MG/L)			DET'N LIMIT = 0.001		GUIDELINE = 1 (A1)			
JAN	.004 <T	.003 <T	BOL	BOL	BOL	BOL	BOL	BOL
FEB	.002 <T	.001 <T	.002 <T	115			.004 <T	.001 <T
MAR	.003 <T	.002 <T	115	.002 <T			.002 <T	.001 <T
APR	.003 <T	.001 <T	.002 <T	.001 <T			.001 <T	.001 <T
MAY	.004 <T	.002 <T	.002 <T	.002 <T			.002 <T	.002 <T
JUN	.020	.015	.028	.010			.016	.012
JUL	.003 <T	.002 <T	.002 <T	.001 <T			.005	.002 <T
AUG	.002 <T	.002 <T	.003 <T	.002 <T			.004 <T	.002 <T
SEP	.004 <T	BOL	.002 <T	.001 <T			.002 <T	.001 <T
OCT	.002 <T	.001 <T	.003 <T	.002 <T			.002 <T	.001 <T
NOV	.008	.006	.007	.006			.002 <T	.005
DEC	.002 <T	.002 <T	.002 <T	BOL			.006	.001 <T
TOTAL NITRATES (MG/L)			DET'N LIMIT = 0.005		GUIDELINE = 10 (A1)			
JAN	.090	.105	BOL	.135	.165	.115	.165	.115
FEB	.105	.125	.120	.115			.165	.125
MAR	.110	.120	115	.120			.130	
APR	.085	.085	.085	.085			.085	.080
MAY	.040	.035	.040	.035			.055	.050
JUN	.035	.035	.045	.030			.040	.030
JUL	.045	.040	.040	.040			.045	.045
AUG	BOL	.065	BOL	BOL			BOL	BOL
SEP	.130	.020 <T	.010 <T	.015 <T			.020 <T	.020 <T
OCT	.030	.030	.035	.030			.030	
NOV	.065	.060	.060	.060			.060	.060
DEC	.065	.080	.080	.075			.075	.070

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT FRANCES WTP 1990

SITE TYPE	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM					
	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
NITROGEN TOT KJ/LD (NG/L)								
			DET'N LIMIT = 0.02		GUIDELINE = N/A			
JAN	.410	.220	.220	.210	.430	.220	.430	.220
FEB	.390	.210	.210	.220	.	.	.450	.210
MAR	.400	.510	.115	.320	.	.	.300	.
APR	.400	.180	.200	.220	.	.	.180	.170
MAY	.420	.220	.240	.220	.	.	.340	.200
JUN	.410	.230	.220	.220	.	.	.330	.220
JUL	.440	.230	.300	.200	.	.	.270	.220
AUG	.370	.160	.140	.200	.	.	.150	.130
SEP	.320	.230	.240	.240	.	.	.350	.220
OCT	.360	.190	.200	.180	.	.	.210	.
NOV	.310	.170	.170	.180	.	.	.180	.730
DEC	.350	.250	.190	.200	.	.	.200	.180
PH (DNMSLESS)								
			DET'N LIMIT = N/A		GUIDELINE = 6.5-8.5(A4)			
JAN	7.590	7.860	7.800	7.850	7.850	7.840	7.850	7.840
FEB	7.440	7.680	7.720	.115	.	.	7.720	7.660
MAR	7.520	7.910	.115	7.740	.	.	7.830	.
APR	7.560	7.870	7.810	7.820	.	.	7.790	7.840
MAY	7.460	7.250	7.520	7.540	.	.	7.510	7.460
JUN	7.560	7.960	7.860	7.900	.	.	7.970	7.800
JUL	7.450	7.120	7.360	7.270	.	.	7.370	7.450
AUG	7.300	7.760	7.690	7.740	.	.	7.830	7.630
SEP	7.460	7.860	7.730	7.800	.	.	7.900	7.750
OCT	7.460	5.290	6.520	6.210	.	.	6.120	.
NOV	7.540	7.800	7.770	7.770	.	.	7.790	7.790
DEC	7.580	7.670	7.780	7.770	.	.	7.740	7.820
PHOSPHORUS FIL REACT (NG/L)								
			DET'N LIMIT = 0.0005		GUIDELINE = N/A			
JAN	BDL	.002	.	.	.	.	.	.
FEB	.000 <T	.003	.	.	.	.	.	.
MAR	.000 <T	.003	.	.	.	.	.	.
APR	BDL	.002	.	.	.	.	.	.
MAY	.002 <T	.001 <T	.	.	.	.	.	.
JUN	.002	.001 <T	.	.	.	.	.	.
JUL	.019	.001 <T	.	.	.	.	.	.
AUG	.001 <T	.000 <T	.	.	.	.	.	.
SEP	.005	.001 <T	.	.	.	.	.	.
OCT	.002 <T	.002 <T	.	.	.	.	.	.
NOV	.001 <T	.002	.	.	.	.	.	.
DEC	.000 <T	.014	.	.	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT FRANCES WTP 1990
DISTRIBUTION SYSTEM

WATER TREATMENT PLANT

SITE TYPE	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
PHOSPHORUS TOTAL (MG/L)			DET'N LIMIT = 0.002		GUIDELINE = .40 (F2)			
JAN	.014	.009 <T						
FEB	.014	.006 <T						
MAR	.016	.006 <T						
APR	.012	.004 <T						
MAY	.012	.008 <T						
JUN	.013	.007 <T						
JUL	.020	.005 <T						
AUG	.022	.003 <T						
SEP	.038	.008 <T						
OCT	.021	.007 <T						
NOV	.011	.004 <T						
DEC	.014	.023						
SULPHATE (MG/L)			DET'N LIMIT = .200		GUIDELINE = 500 (A3)			
JAN	3.270	19.680	20.440	19.780	20.190	20.090	20.190	20.090
FEB	3.290	20.500	21.010	11S			20.320	20.820
MAR	3.770	17.880	11S	17.470			18.030	
APR	3.160	19.370	19.160	19.420			19.520	19.520
MAY	3.160	18.500	19.520	18.990			17.800	17.560
JUN	3.670	17.840	17.510	17.490			18.100	18.340
JUL	2.930	18.750	18.940	18.760			19.090	18.560
AUG	2.610	20.290	21.050	20.460			20.890	20.290
SEP	2.940	17.170	17.400	16.240			17.220	17.960
OCT	3.820	18.980	19.380	19.730			18.920	
NOV	3.290	16.680	17.090	17.160			17.460	17.130
DEC	3.060	16.810	16.570	16.860			16.780	17.010
TURBIDITY (FTU)			DET'N LIMIT = 0.05		GUIDELINE = 1 (A1)			
JAN	1.000	.620	.900	.520	1.300	.990	1.300	.990
FEB	.910	.520	.880	11S			2.700	.920
MAR	1.400	.470	11S	.910			3.700	
APR	1.020	.210	.570	.430			3.500	.340
MAY	1.330	.690	.730	.430			1.750	.530
JUN	1.400	.280	.720	.460			.670	.590
JUL	1.800	.380	1.700	.300			14.300	.600
AUG	3.400	.400	.560	.350			10.800	.640
SEP	16.900	.210 <T	.210 <T	.280			1.800	.450
OCT	3.500	.250 <T	3.700	.820			1.500	
NOV	2.300	.470	.400	.590			.760	.520
DEC	2.300	2.300	1.640	1.750			12.500	.810

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT FRANCES WTP 1990

DISTRIBUTION SYSTEM									
WATER TREATMENT PLANT									
SITE	RAW	TREATED	SITE 1		SITE 2		SITE 3		
TYPE			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW	
METALS									
SILVER (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = 50 (A1)				
JAN	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
FEB	BDL	BDL	.080 <T	BDL	BDL	BDL	BDL	BDL	BDL
MAR	BDL	BDL	BDL	BDL	BDL	BDL	.070 <T	BDL	BDL
APR	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
MAY	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
JUN	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
JUL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
AUG	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
SEP	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
OCT	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
NOV	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
DEC	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
ALUMINUM (UG/L)									
JAN	39.000	240.000	170.000	180.000	180.000	180.000	180.000	190.000	
FEB	38.000	180.000	98.000	150.000	150.000	150.000	150.000	140.000	
MAR	39.000	140.000	110.000	130.000	130.000	130.000	130.000	120.000	
APR	46.000	140.000	92.000	120.000	120.000	120.000	120.000	120.000	
MAY	46.000	160.000	63.000	78.000	78.000	78.000	120.000	110.000	
JUN	47.000	210.000	76.000	170.000	170.000	170.000	120.000	120.000	
JUL	45.000	110.000	95.000	77.000	77.000	77.000	130.000	99.000	
AUG	77.000	260.000	39.000	75.000	75.000	75.000	99.000	70.000	
SEP	320.000	110.000	79.000	130.000	130.000	130.000	160.000	120.000	
OCT	74.000	120.000	5.200	3.800	3.800	3.800	2.800	2.900	
NOV	53.000	160.000	98.000	100.000	100.000	100.000	97.000	98.000	
DEC	45.000	150.000	120.000	120.000	120.000	120.000	130.000	140.000	
ARSENIC (UG/L)									
JAN	.540 <T	.330 <T	.370 <T	.340 <T	.340 <T	.340 <T	.440 <T	.370 <T	
FEB	.440 <T	.250 <T	.240 <T	.170 <T	.170 <T	.170 <T	.380 <T	.210 <T	
MAR	.510 <T	.190 <T	.180 <T	.110 <T	.110 <T	.110 <T	.290 <T		
APR	.570 <T	.610 <T	.480 <T	.540 <T	.540 <T	.540 <T	.620 <T	.520 <T	
MAY	.310 <T	.400 <T	.280 <T	.230 <T	.230 <T	.230 <T	.410 <T	.320 <T	
JUN	.180 <T	.230 <T	BDL	.230 <T	.230 <T	.230 <T	.410 <T	.280 <T	
JUL	.610 <T	.270 <T	.290 <T	.320 <T	.320 <T	.320 <T	.310 <T	.410 <T	
AUG	.330 <T	.210 <T	.210 <T	.250 <T	.250 <T	.250 <T	.230 <T	.180 <T	
SEP	.810 <T	.360 <T	.370 <T	.360 <T	.360 <T	.360 <T	.390 <T	.330 <T	
OCT	.510 <T	.460 <T	.260 <T	.320 <T	.320 <T	.320 <T	.280 <T	.370 <T	
NOV	.530 <T	.510 <T	.480 <T	.500 <T	.500 <T	.500 <T	.460 <T	.360 <T	
DEC	.460 <T	.610 <T	.490 <T	.470 <T	.470 <T	.470 <T	.400 <T	.490 <T	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT FRANCES WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

DISTRIBUTION SYSTEM									
SITE		RAW	TREATED	SITE 1		SITE 2		SITE 3	
TYPE				STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
BARIUM (UG/L)				DET'N LIMIT = 0.05		GUIDELINE = 1000 (A2)			
JAN	8.500	8.200		13.000	8.000				
FEB	8.500	8.400		8.300	7.400			8.600	8.500
MAR	8.500	8.300		7.000	7.700			7.600	7.700
APR	7.800	7.800		7.700	7.200			8.100	
MAY	7.800	7.600		6.700	7.200			7.700	7.600
JUN	8.300	7.600		6.400	6.300			8.700	8.800
JUL	8.300	8.200		10.000	10.000			8.600	8.100
AUG	8.200	7.400		6.600	6.400			9.400	9.000
SEP	14.000	7.500		5.500	5.500			7.100	7.300
OCT	8.100	7.800		9.600	8.900			6.300	7.000
NOV	8.300	7.900		6.400	6.500			8.900	8.500
DEC	7.900	7.600		6.500	6.900			7.200	7.200
BORON (UG/L)				DET'N LIMIT = 2.00		GUIDELINE = 5000 (A1)			
JAN	6.300 <T	6.700 <T		7.100 <T	7.800 <T			14.000 <T	10.000 <T
FEB	6.900 <T	6.400 <T		6.700 <T	8.700 <T			12.000 <T	6.300 <T
MAR	6.900 <T	9.800 <T		9.800 <T	8.300 <T			10.000 <T	
APR	11.000 <T	16.000 <T		13.000 <T	16.000 <T			15.000 <T	
MAY	12.000 <T	14.000 <T		16.000 <T	14.000 <T			15.000 <T	5.900 <T
JUN	6.900 <T	8.800 <T		8.500 <T	7.100 <T			9.500 <T	14.000 <T
JUL	8.200 <T	9.500 <T		14.000 <T	9.700 <T			7.600 <T	7.600 <T
AUG	8.500 <T	10.000 <T		8.200 <T	9.400 <T			9.800 <T	9.900 <T
SEP	10.000 <T	10.000 <T		13.000 <T	13.000 <T			10.000 <T	8.900 <T
OCT	4.100 <T	3.900 <T		3.000 <T	3.200 <T			13.000 <T	12.000 <T
NOV	5.700 <T	5.900 <T		5.700 <T	6.300 <T			78.000	5.500 <T
DEC	6.500 <T	8.300 <T		7.200 <T	7.800 <T			6.200 <T	5.800 <T
BERYLLIUM (UG/L)				DET'N LIMIT = 0.05		GUIDELINE = 6800 (D4)			
JAN	BOL	BOL		BOL	BOL			BOL	BOL
FEB	BOL	BOL		BOL	BOL			BOL	BOL
MAR	BOL	BOL		BOL	BOL			BOL	BOL
APR	BOL	BOL		BOL	BOL			BOL	BOL
MAY	BOL	BOL		BOL	BOL			BOL	BOL
JUN	BOL	BOL		BOL	BOL			BOL	BOL
JUL	BOL	BOL		BOL	BOL			BOL	BOL
AUG	BOL	BOL		BOL	BOL			BOL	BOL
SEP	BOL	BOL		BOL	BOL			BOL	BOL
OCT	BOL	BOL		BOL	BOL			BOL	BOL
NOV	BOL	BOL		BOL	BOL			BOL	BOL
DEC	BOL	BOL		BOL	BOL			BOL	BOL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT FRANCES WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

SITE TYPE	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
CADMIUM (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = 5 (A1)			
JAN	BOL	BOL	BOL	BOL	BOL	BOL	-210 <T	BOL
FEB	BOL	BOL	BOL	BOL	BOL	BOL	-560	BOL
MAR	BOL	BOL	BOL	BOL	BOL	BOL	-090 <T	BOL
APR	BOL	BOL	BOL	BOL	BOL	BOL	BOL	BOL
MAY	BOL	BOL	BOL	BOL	BOL	BOL	BOL	BOL
JUN	BOL	BOL	BOL	BOL	BOL	BOL	BOL	BOL
JUL	BOL	BOL	BOL	BOL	BOL	BOL	BOL	BOL
AUG	BOL	BOL	BOL	BOL	BOL	BOL	BOL	BOL
SEP	BOL	BOL	BOL	BOL	BOL	BOL	-460 <T	BOL
OCT	BOL	BOL	BOL	BOL	BOL	BOL	BOL	BOL
NOV	BOL	BOL	BOL	BOL	BOL	BOL	BOL	BOL
DEC	BOL	BOL	BOL	BOL	BOL	BOL	BOL	BOL
COBALT (UG/L)			DET'N LIMIT = 0.02		GUIDELINE = N/A			
JAN	.070 <T	.150 <T	.100 <T	.080 <T	.080 <T	.080 <T	-070 <T	.090 <T
FEB	.210 <T	.150 <T	.060 <T	.060 <T	.060 <T	.060 <T	.100 <T	.130 <T
MAR	.140 <T	.150 <T	.070 <T	.070 <T	.070 <T	.070 <T	.230 <T	.060 <T
APR	.100 <T	.090 <T	.090 <T	.080 <T	.080 <T	.080 <T	.070 <T	.060 <T
MAY	.060 <T	.080 <T	.050 <T	.040 <T	.040 <T	.040 <T	.070 <T	.090 <T
JUN	.100 <T	.080 <T	.110 <T	.080 <T	.080 <T	.080 <T	.090 <T	.050 <T
JUL	.070 <T	.100 <T	.120 <T	.060 <T	.060 <T	.060 <T	.090 <T	.040 <T
AUG	.070 <T	.030 <T	.050 <T	.030 <T	.030 <T	.030 <T	.110 <T	.080 <T
SEP	.450 <T	.090 <T	.060 <T	.070 <T	.070 <T	.070 <T	BOL	BOL
OCT	.130 <T	.110 <T	.060 <T	.120 <T	.120 <T	.120 <T	.070 <T	.070 <T
NOV	.080 <T	.100 <T	.070 <T	.080 <T	.080 <T	.080 <T	.100 <T	.080 <T
DEC	.090 <T	.070 <T	.080 <T	.080 <T	.080 <T	.080 <T		
CHROMIUM (UG/L)			DET'N LIMIT = 0.50		GUIDELINE = 50 (A1)			
JAN	BOL	BOL	BOL	BOL	BOL	BOL	1.400 <T	BOL
FEB	BOL	BOL	BOL	BOL	BOL	BOL	BOL	BOL
MAR	BOL	.590 <T	.710 <T	.600 <T	.600 <T	.600 <T	.840 <T	BOL
APR	BOL	.640 <T	.740 <T	.600 <T	.600 <T	.600 <T	BOL	BOL
MAY	.650 <T	.980 <T	1.000 <T	.760 <T	.760 <T	.760 <T	.670 <T	.540 <T
JUN	.690 <T	BOL	BOL	BOL	BOL	BOL	.840 <T	.850 <T
JUL	BOL	BOL	BOL	BOL	BOL	BOL	BOL	BOL
AUG	.570 <T	BOL	BOL	BOL	BOL	BOL	BOL	BOL
SEP	2.100 <T	1.500 <T	2.200 <T	2.100 <T	2.100 <T	2.100 <T	2.000 <T	1.900 <T
OCT	.720 <T	BOL	BOL	BOL	BOL	BOL	BOL	BOL
NOV	BOL	BOL	BOL	BOL	BOL	BOL	.570 <T	.530 <T
DEC	.550 <T	.660 <T	.730 <T	.610 <T	.610 <T	.610 <T	.640 <T	BOL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT FRANCES WTP 1990

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM					
SITE TYPE	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
COPPER (UG/L)			DET'M LIMIT = 0.50		GUIDELINE = 1000 (A3)			
JAN	4,900 <T	6,400	590,000	32,000	-	-	75,000	12,000
FEB	5,000 <T	9,000	560,000	36,000	-	-	100,000	20,000
MAR	4,800 <T	2,800 <T	170,000	21,000	-	-	50,000	-
APR	6,200	4,600 <T	300,000	23,000	-	-	6,300	11,000
MAY	5,400	9,300	230,000	40,000	-	-	24,000	12,000
JUN	11,000	8,800	400,000	36,000	-	-	99,000	24,000
JUL	13,000	37,000	750,000	110,000	-	-	19,000	40,000
AUG	13,000	3,900 <T	380,000	42,000	-	-	23,000	16,000
SEP	56,000	3,100 <T	240,000	32,000	-	-	70,000	20,000
OCT	6,400	130,000	46,000	15,000	-	-	5,100	7,100
NOV	5,200	7,300	31,000	16,000	-	-	8,200	10,000
DEC	5,800	5,300	44,000	16,000	-	-	16,000	6,700
IRON (UG/L)			DET'M LIMIT = 6.00		GUIDELINE = 300 (A3)			
JAN	75,000	14,000 <T	23,000 <T	17,000 <T	-	-	66,000	21,000 <T
FEB	69,000	8,000 <T	14,000 <T	26,000 <T	-	-	360,000	200,000
MAR	71,000	18,000 <T	7,400 <T	9,300 <T	-	-	150,000	-
APR	89,000	BOL	BOL	BOL	-	-	180,000	15,000 <T
MAY	110,000	9,100 <T	BOL	11,000 <T	-	-	130,000	15,000 <T
JUN	97,000	11,000 <T	9,700 <T	20,000 <T	-	-	780,000	39,000 <T
JUL	95,000	BOL	53,000 <T	BOL	-	-	380,000	22,000 <T
AUG	130,000	7,900 <T	6,700 <T	7,000 <T	-	-	110,000	50,000 <T
SEP	550,000	BOL	8,400 <T	BOL	-	-	BOL	BOL
OCT	120,000	8,300 <T	BOL	19,000 <T	-	-	33,000 <T	17,000 <T
NOV	73,000	6,100 <T	27,000 <T	24,000 <T	-	-	590,000	46,000 <T
DEC	85,000	7,400 <T			-	-		
MANGANESE (UG/L)			DET'M LIMIT = 0.05		GUIDELINE = 50 (A3)			
JAN	3,100	.820	2,900	1,400	-	-	2,900	1,200
FEB	2,800	.750	2,000	1,300	-	-	8,700	5,600
MAR	3,700	1,200	1,500	1,700	-	-	3,500	-
APR	5,000	1,700	2,600	2,000	-	-	3,100	1,700
MAY	7,500	2,000	2,400	2,400	-	-	4,400	2,300
JUN	9,400	2,100	2,700	2,400	-	-	4,600	2,300
JUL	5,600	2,200	7,500	3,200	-	-	8,400	3,400
AUG	20,000	3,300	2,200	1,900	-	-	5,700	2,300
SEP	150,000	1,700	2,500	1,800	-	-	4,200	2,200
OCT	7,100	1,600	.060 <T	BOL	-	-	BOL	BOL
NOV	5,500	1,200	1,900	2,300	-	-	1,900	1,400
DEC	4,000	.760	2,700	2,000	-	-	4,200	2,100

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT FRANCES WTP 1990

DISTRIBUTION SYSTEM

WATER TREATMENT PLANT

SITE TYPE	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
MOLYBDENUM (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = N/A			
JAN	BOL	.160 <T	.100 <T	.150 <T			.140 <T	.150 <T
FEB	.120 <T	.210 <T	.140 <T	.110 <T			.130 <T	.100 <T
MAR	.080 <T	.160 <T	.180 <T	.220 <T			.120 <T	.100 <T
APR	BOL	.110 <T	.120 <T	.090 <T			.090 <T	.100 <T
MAY	.120 <T	.110 <T	.090 <T	.150 <T			.130 <T	BOL
JUN	.100 <T	.140 <T	.110 <T	.130 <T			.140 <T	.100 <T
JUL	.070 <T	.090 <T	.100 <T	.070 <T			BOL	.070 <T
AUG	.140 <T	.140 <T	.110 <T	.100 <T			BOL	.130 <T
SEP	BOL	.220 <T	.150 <T	.120 <T			.140 <T	.090 <T
OCT	.070 <T	BOL	.110 <T	BOL			.140 <T	.110 <T
NOV	.070 <T	.120 <T	.140 <T	.130 <T			.120 <T	.100 <T
DEC	BOL	.110 <T	.100 <T	.080 <T			.060 <T	
NICKEL (UG/L)			DET'N LIMIT = 0.20		GUIDELINE = 350 (D3)			
JAN	.480 <T	.490 <T	1.700 <T	.290 <T			2.200	.500 <T
FEB	.990 <T	.420 <T	2.100	.430 <T			1.100 <T	.340 <T
MAR	.390 <T	.370 <T	.910 <T	BOL			1.100 <T	
APR	.980 <T	.640 <T	1.400 <T	.690 <T			.900 <T	.560 <T
MAY	.820 <T	.520 <T	5.000	.420 <T			1.900 <T	.420 <T
JUN	.860 <T	.380 <T	1.600 <T	BOL			1.200 <T	.230 <T
JUL	.850 <T	.610 <T	7.800	.580 <T			4.000	.430 <T
AUG	.860 <T	.460 <T	4.900	.740 <T			3.000	.490 <T
SEP	3.700	.240 <T	2.100	.270 <T			1.200 <T	BOL
OCT	.690 <T	.610 <T	BOL	BOL			BOL	BOL
NOV	.570 <T	.560 <T	.930 <T	.510 <T			.980 <T	.460 <T
DEC	BOL	.300 <T	.660 <T	.380 <T			.760 <T	.220 <T
LEAD (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = 10. (A1)			
JAN	.320 <T	.420 <T	13.000	3.900			5.600	.220 <T
FEB	.220 <T	.060 <T	31.000	5.000			19.000	.220 <T
MAR	.170 <T	.090 <T	5.100	3.700			5.000	BOL
APR	.170 <T	.070 <T	6.900	4.200			.570	.120 <T
MAY	.220 <T	.100 <T	8.200	7.000			8.200	.130 <T
JUN	.440 <T	.220 <T	11.000	7.400			4.500	.200 <T
JUL	.450 <T	.240 <T	21.000	20.000			4.300	BOL
AUG	.890	BOL	12.000	11.000			5.100	.140 <T
SEP	11.000	.100 <T	11.000	10.000			7.700	.100 <T
OCT	.260 <T	.580	59.000	51.000			.420 <T	.180 <T
NOV	.260 <T	.150 <T	5.600	5.100			.470 <T	.120 <T
DEC	.220 <T	.070 <T	5.400	4.000			2.100	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT FRANCES WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

SITE TYPE	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
ANTIMONY (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = 146 (D4)			
JAN	.300 <T	.380 <T	.330 <T	.330 <T	.	.	.440 <T	.340 <T
FEB	.530	.360 <T	.440 <T	.430 <T	.	.	.530	.420 <T
MAR	.430 <T	.470 <T	.340 <T	.270 <T	.	.	.680	.
APR	.320 <T	.350 <T	.480 <T	.340 <T	.	.	.360 <T	.220 <T
MAY	.370 <T	.430 <T	.370 <T	.510	.	.	.500 <T	.360 <T
JUN	.330 <T	.400 <T	.470 <T	.530	.	.	.510	.540
JUL	.260 <T	.310 <T	.460 <T	.330 <T	.	.	.370 <T	.440 <T
AUG	.280 <T	.360 <T	.340 <T	.280 <T	.	.	.220 <T	.270 <T
SEP	.300 <T	.370 <T	.470 <T	.380 <T	.	.	.410 <T	.410 <T
OCT	.310 <T	.300 <T	1.100	1.100	.	.	1.300	1.100
NOV	.240 <T	.410 <T	.340 <T	.290 <T	.	.	.300 <T	.330 <T
DEC	.310 <T	.350 <T	.340 <T	.320 <T	.	.	.330 <T	.390 <T
SELENIUM (UG/L)			DET'N LIMIT = 1.00		GUIDELINE = 10 (A1)			
JAN	BDL	BDL	BDL	BDL	.	.	BDL	BDL
FEB	BDL	BDL	BDL	BDL	.	.	BDL	BDL
MAR	BDL	BDL	BDL	BDL	.	.	BDL	.
APR	BDL	BDL	BDL	BDL	.	.	BDL	BDL
MAY	BDL	BDL	BDL	BDL	.	.	BDL	BDL
JUN	BDL	BDL	BDL	BDL	.	.	BDL	BDL
JUL	BDL	BDL	BDL	BDL	.	.	BDL	BDL
AUG	BDL	BDL	BDL	BDL	.	.	BDL	BDL
SEP	BDL	BDL	BDL	BDL	.	.	BDL	BDL
OCT	BDL	BDL	1.100 <T	BDL	.	.	1.100 <T	BDL
NOV	BDL	BDL	BDL	BDL	.	.	BDL	BDL
DEC	BDL	BDL	BDL	BDL	.	.	BDL	BDL
STRONTIUM (UG/L)			DET'N LIMIT = 0.10		GUIDELINE = N/A			
JAN	23.000	22.000	28.000	22.000	.	.	23.000	23.000
FEB	22.000	21.000	22.000	21.000	.	.	22.000	22.000
MAR	21.000	21.000	21.000	21.000	.	.	21.000	.
APR	20.000	20.000	21.000	20.000	.	.	20.000	20.000
MAY	22.000	21.000	19.000	20.000	.	.	21.000	21.000
JUN	21.000	19.000	20.000	19.000	.	.	21.000	20.000
JUL	20.000	21.000	23.000	22.000	.	.	22.000	23.000
AUG	20.000	20.000	19.000	18.000	.	.	19.000	19.000
SEP	21.000	20.000	19.000	18.000	.	.	18.000	19.000
OCT	19.000	19.000	25.000	24.000	.	.	27.000	29.000
NOV	21.000	21.000	19.000	20.000	.	.	20.000	20.000
DEC	20.000	20.000	20.000	21.000	.	.	21.000	19.000

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT FRANCES WTP 1990

DISTRIBUTION SYSTEM

WATER TREATMENT PLANT

SITE TYPE	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
TITANIUM (UG/L)			DET'N LIMIT = 0.50		GUIDELINE = N/A		GUIDELINE = 100 (A1)	
JAN	5.100	5.100	5.500	4.900 <T	4.900 <T	4.900 <T	4.900 <T	5.000 <T
FEB	4.200 <T	3.800 <T	4.000 <T	3.500 <T	3.500 <T	3.500 <T	3.500 <T	3.800 <T
MAR	4.400 <T	3.800 <T	3.600 <T	4.000 <T	4.000 <T	4.000 <T	4.000 <T	4.900 <T
APR	3.700 <T	3.000 <T	3.100 <T	3.200 <T	3.200 <T	3.200 <T	3.200 <T	3.400 <T
MAY	3.800 <T	3.900 <T	3.400 <T	3.900 <T	3.900 <T	3.900 <T	3.900 <T	3.800 <T
JUN	6.700	6.800	6.300	6.500	6.500	6.500	7.000	7.100
JUL	3.100 <T	2.600 <T	3.400 <T	2.600 <T	2.600 <T	2.600 <T	2.900 <T	2.900 <T
AUG	5.400	3.100 <T	3.100 <T	3.000 <T	3.000 <T	3.000 <T	2.800 <T	2.800 <T
SEP	6.600	.950 <T	.990 <T	.990 <T	.990 <T	.990 <T	1.100 <T	.800 <T
OCT	3.700 <T	1.900 <T	1.200 <T	1.400 <T	1.400 <T	1.400 <T	2.100 <T	1.400 <T
NOV	3.900 <T	3.000 <T	2.900 <T	2.700 <T	2.700 <T	2.700 <T	2.500 <T	2.900 <T
DEC	2.400 <T	2.000 <T	1.700 <T	1.800 <T	1.800 <T	1.800 <T	1.800 <T	1.800 <T
URANIUM (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = 100 (A1)		GUIDELINE = N/A	
JAN	.070 <T	BDL	BDL	BDL	BDL	BDL	BDL	BDL
FEB	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
MAR	.060 <T	BDL	BDL	BDL	BDL	BDL	BDL	BDL
APR	.070 <T	BDL	BDL	BDL	BDL	BDL	BDL	BDL
MAY	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
JUN	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
JUL	.060 <T	BDL	BDL	BDL	BDL	BDL	BDL	BDL
AUG	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
SEP	.120 <T	BDL	BDL	BDL	BDL	BDL	BDL	BDL
OCT	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
NOV	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
DEC	.070 <T	BDL	BDL	BDL	BDL	BDL	BDL	BDL
VANADIUM (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = N/A		GUIDELINE = N/A	
JAN	.200 <T	.110 <T	.060 <T	.070 <T	.070 <T	.070 <T	.070 <T	.080 <T
FEB	.250 <T	.100 <T	BDL	BDL	BDL	BDL	BDL	BDL
MAR	.240 <T	.100 <T	.100 <T	.100 <T	.100 <T	.100 <T	.110 <T	.120 <T
APR	.260 <T	.120 <T	.100 <T	.130 <T	.130 <T	.130 <T	.120 <T	.120 <T
MAY	.200 <T	BDL	BDL	BDL	BDL	BDL	BDL	BDL
JUN	.300 <T	.140 <T	.080 <T	.140 <T	.140 <T	.140 <T	.110 <T	.110 <T
JUL	.300 <T	.110 <T	.110 <T	.090 <T	.090 <T	.090 <T	.160 <T	.110 <T
AUG	.390 <T	.110 <T	BDL	.090 <T	.090 <T	.090 <T	.110 <T	.100 <T
SEP	1.200	.160 <T	.110 <T	.130 <T	.130 <T	.130 <T	.140 <T	.160 <T
OCT	.340 <T	.060 <T	BDL	BDL	BDL	BDL	BDL	.060 <T
NOV	.260 <T	.060 <T	BDL	.090 <T	.090 <T	.090 <T	BDL	BDL
DEC	.130 <T	BDL	BDL	BDL	BDL	BDL	BDL	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT FRANCES WTP 1990

SITE TYPE	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM					
	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
ZINC (UG/L)			DET'N LIMIT = 0.20		GUIDELINE = 5000 (AS)			
JAN	2,900	12,000	21,000	9,500			39,000	11,000
FEB	2,300	17,000	16,000	8,700			25,000	11,000
MAR	2,400	11,000	21,000	11,000			26,000	
APR	3,100	12,000	16,000	9,800			11,000	9,400
MAY	3,500	16,000	12,000	9,800			25,000	16,000
JUN	10,000	14,000	20,000	6,900			27,000	15,000
JUL	6,700	24,000	43,000	19,000			29,000	22,000
AUG	6,900	16,000	10,000	7,300			21,000	12,000
SEP	18,000	14,000	4,700	3,000			11,000	7,200
OCT	3,400	20,000	13,000	2,300			.990 <T	1,200 <T
NOV	2,800	7,300	5,000	5,000			6,600	5,700
DEC	3,000	7,600	7,400	5,800			11,000	6,000

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT FRANCES WTP 1990

DISTRIBUTION SYSTEM

WATER TREATMENT PLANT

SITE TYPE	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
CHLOROCARBOXYLIC ACIDS								
HEXACHLOROETHANE (NG/L)			DET'N LIMIT = 1.000		GUIDELINE = 1900 (D4)			
JAN	BDL	BDL		BDL				BDL
FEB	1QU	1QU		1QU				1QU
MAR	BDL	BDL		BDL				BDL
APR	BDL	11S		BDL				BDL
MAY	BDL	BDL		BDL				BDL
JUN	BDL	BDL		BDL				BDL
JUL	BDL	BDL		BDL				BDL
AUG	BDL	BDL		BDL				BDL
SEP	BDL	BDL		BDL				BDL
OCT	BDL	BDL		BDL				BDL
NOV	BDL	BDL		BDL				BDL
DEC	BDL	BDL		BDL				2,000 <T
245 TRICHLOROTOLUENE (NG/L)			DET'N LIMIT = 5.000		GUIDELINE = N/A			
JAN	BDL	BDL		BDL				BDL
FEB	1QU	1QU		1QU				1QU
MAR	BDL	BDL		BDL				BDL
APR	BDL	11S		BDL				BDL
MAY	BDL	BDL		BDL				BDL
JUN	BDL	BDL		BDL				BDL
JUL	BDL	BDL		BDL				BDL
AUG	BDL	BDL		BDL				BDL
SEP	BDL	BDL		20,000 <T				BDL
OCT	BDL	BDL		BDL				BDL
NOV	BDL	BDL		BDL				BDL
DEC	BDL	BDL		BDL				BDL
HEXACHLOROCHLOROCYCLOPENTADIENE (NG/L)			DET'N LIMIT = 5.0		GUIDELINE = 260000 (D4)			
OCT	BDL	240,000		15,000 <T				20,000 <T
NOV	BDL	BDL		BDL				BDL
DEC	BDL	BDL		BDL				BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT FRANCES WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

SITE TYPE	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
PHENANTHRENE (NG/L)								
			DET'N LIMIT = 10.		GUIDELINE = N/A			
JAN	BOL	BOL	.	.	.	.	.	.
FEB	100	100	.	.	.	.	.	.
MAR	BOL	BOL	.	.	.	.	.	.
APR	BOL	BOL	.	.	.	.	.	.
MAY	BOL	BOL	.	.	.	.	.	.
JUN	BOL	BOL	.	.	.	.	.	.
JUL	BOL	BOL	.	.	.	.	.	.
AUG	BOL	BOL	.	.	.	.	.	.
SEP	BOL	BOL	.	10,000 <T	.	.	.	BOL
OCT	BOL	BOL	.	.	.	.	.	.
NOV	BOL	BOL	.	.	.	.	.	.
DEC	BOL	BOL	.	.	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT FRANCES WTP 1990
WATER TREATMENT PLANT
DISTRIBUTION SYSTEM

SITE TYPE	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
PESTICIDES & PCB								
ALPHA BHC (NG/L)			DET'N LIMIT = 1.000		GUIDELINE = 700 (G)			
JAN	1.000 <T	BDL	*	1.000 <T	*	*	1.000 <T	1.000 <T
FEB	10U	10U	*	10U	*	*	10U	10U
MAR	BDL	BDL	*	BDL	*	*	BDL	BDL
APR	1.000 <T	11S	*	BDL	*	*	1.000 <T	1.000 <T
MAY	1.000 <T	BDL	*	2.000 <T	*	*	1.000 <T	1.000 <T
JUN	BDL	1.000 <T	*	1.000 <T	*	*	BDL	BDL
JUL	1.000 <T	1.000 <T	*	1.000 <T	*	*	1.000 <T	1.000 <T
AUG	BDL	BDL	*	1.000 <T	*	*	BDL	BDL
SEP	BDL	1.000 <T	*	1.000 <T	*	*	1.000 <T	1.000 <T
OCT	1.000 <T	1.000 <T	*	1.000 <T	*	*	1.000 <T	1.000 <T
NOV	1.000 <T	1.000 <T	*	1.000 <T	*	*	1.000 <T	1.000 <T
DEC	BDL	BDL	*	BDL	*	*	BDL	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT FRANCES WTP 1990
DISTRIBUTION SYSTEM

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM					
SITE TYPE	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
PHENOLICS			DET'N LIMIT = .20 GUIDELINE = 2 (A4)					
PHENOLICS (UG/L)								
JAN	.600 <T	.800 <T	.	.	.	.	.	.
FEB	.600 <T	.600 <T	.	.	.	.	.	.
MAR	1.000	1.600	.	.	.	.	.	.
APR	BOL	BOL	.	.	.	.	.	.
MAY	BOL	BOL	.	.	.	.	.	.
JUN	BOL	.600 <T	.	.	.	.	.	.
JUL	.400 <T	.600 <T	.	.	.	.	.	.
AUG	BOL	BOL	.	.	.	.	.	.
SEP	.600 <T	1PR	.	.	.	.	.	.
OCT	1.200	1.200	.	.	.	.	.	.
NOV	2.600	1.600	.	.	.	.	.	.
DEC	.800 <T	1.000	.	.	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT FRANCES WTP 1990

		DISTRIBUTION SYSTEM						
		WATER TREATMENT PLANT						
SITE TYPE	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW		
VOLATILES								
BENZENE (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = 5 (A1)			
JAN	BOL	IEF		BOL		BOL	BOL	
FEB	BOL	.100 <T		.100 <T			.150 <T	
MAR	BOL	.050 <T		.050 <T			.050 <T	
APR	BOL	BOL		.100 <T			BOL	
MAY	BOL	.100 <T		.050 <T				
JUN	BOL	BOL		BOL			BOL	
JUL	BOL	BOL		BOL			BOL	
AUG	BOL	BOL		BOL			BOL	
SEP	BOL	BOL		BOL			BOL	
OCT	BOL	BOL		BOL			BOL	
NOV	BOL	BOL		BOL			BOL	
DEC	BOL	BOL		BOL			BOL	
TOLUENE (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = 24 (A3)			
JAN	BOL	IEF		BOL		BOL	BOL	
FEB	BOL	.050 <T		BOL			BOL	
MAR	BOL	BOL		BOL			BOL	
APR	BOL	BOL		BOL			BOL	
MAY	BOL	BOL		.050 <T			BOL	
JUN	BOL	.050 <T		.050 <T			BOL	
JUL	BOL	BOL		.050 <T			BOL	
AUG	BOL	BOL		BOL			BOL	
SEP	BOL	BOL		BOL			BOL	
OCT	BOL	BOL		BOL			BOL	
NOV	BOL	BOL		BOL			BOL	
DEC	BOL	BOL		BOL			BOL	
ETHYLBENZENE (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = 2.4 (A3)			
JAN	BOL	IEF		.100 <T		.100 <T	.100 <T	
FEB	.100 <T	.150 <T		.150 <T			.200 <T	
MAR	BOL	.150 <T		.100 <T			.150 <T	
APR	BOL	.050 <T		.100 <T			.100 <T	
MAY	BOL	.100 <T		.100 <T			BOL	
JUN	BOL	.050 <T		.100 <T			BOL	
JUL	BOL	.050 <T		.100 <T			BOL	
AUG	BOL	BOL		BOL			BOL	
SEP	BOL	BOL		BOL			BOL	
OCT	BOL	BOL		.050 <T			.050 <T	
NOV	BOL	.050 <T		BOL			BOL	
DEC	BOL	.050 <T		BOL			.050 <T	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT FRANCES WTP 1990
DISTRIBUTION SYSTEM

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

DISTRIBUTION SYSTEM												
SITE TYPE	RAW	TREATED	SITE 1			SITE 2			SITE 3			
			STANDING	FREE FLOW	STANDING	STANDING	FREE FLOW	STANDING	STANDING	FREE FLOW	FREE FLOW	
N-XYLENE (UG/L)			DET'N LIMIT = 0.10			GUIDELINE = 300 (A3*)						
JAN	BOL	IEF	.	.500 <T	.	.	.500 <T	.	.	.500 <T	.500 <T	
FEB	BOL	.300 <T	.	.200 <T	.	.	.200 <T	.	.	.300 <T	.300 <T	
MAR	BOL	.100 <T	.	.100 <T	.	.	.100 <T	.	.	.200 <T	.200 <T	
APR	BOL	BOL	.	BOL	.	.	BOL	.	.	.100 <T	.100 <T	
MAY	BOL	BOL	.	BOL	.	.	BOL	.	.	BOL	BOL	
JUN	BOL	BOL	.	BOL	.	.	BOL	.	.	BOL	BOL	
JUL	BOL	BOL	.	BOL	.	.	BOL	.	.	BOL	BOL	
AUG	BOL	BOL	.	BOL	.	.	BOL	.	.	BOL	BOL	
SEP	BOL	BOL	.	BOL	.	.	BOL	.	.	BOL	BOL	
OCT	BOL	BOL	.	BOL	.	.	BOL	.	.	BOL	BOL	
NOV	BOL	BOL	.	BOL	.	.	BOL	.	.	BOL	BOL	
DEC	BOL	BOL	.	BOL	.	.	BOL	.	.	BOL	BOL	
O-XYLENE (UG/L)			DET'N LIMIT = 0.05			GUIDELINE = 300 (A3*)						
JAN	BOL	IEF	.	.150 <T	.	.	.150 <T	.	.	.150 <T	.150 <T	
FEB	BOL	.250 <T	.	.150 <T	.	.	.150 <T	.	.	.200 <T	.200 <T	
MAR	BOL	.150 <T	.	.100 <T	.	.	.100 <T	.	.	.150 <T	.150 <T	
APR	BOL	.100 <T	.	BOL	.	.	BOL	.	.	.100 <T	.100 <T	
MAY	BOL	BOL	.	BOL	.	.	BOL	.	.	BOL	BOL	
JUN	BOL	BOL	.	BOL	.	.	BOL	.	.	BOL	BOL	
JUL	BOL	BOL	.	BOL	.	.	BOL	.	.	BOL	BOL	
AUG	BOL	BOL	.	BOL	.	.	BOL	.	.	BOL	BOL	
SEP	BOL	BOL	.	BOL	.	.	BOL	.	.	BOL	BOL	
OCT	BOL	BOL	.	BOL	.	.	BOL	.	.	BOL	BOL	
NOV	BOL	BOL	.	BOL	.	.	BOL	.	.	BOL	BOL	
DEC	BOL	BOL	.	.050 <T	.	.	.050 <T	.	.	BOL	BOL	
STYRENE (UG/L)			DET'N LIMIT = 0.05			GUIDELINE = 100 (D1)						
JAN	BOL	IEF	.	.100 <T	.	.	.100 <T	.	.	BOL	BOL	
FEB	.150 <T	.150 <T	.	.100 <T	.	.	.100 <T	.	.	.200 <T	.200 <T	
MAR	BOL	.100 <T	.	.150 <T	.	.	.150 <T	.	.	.150 <T	.150 <T	
APR	BOL	.100 <T	.	.200 <T	.	.	.200 <T	.	.	BOL	BOL	
MAY	BOL	.150 <T	.	BOL	.	.	.200 <T	.	.	BOL	BOL	
JUN	BOL	BOL	.	.200 <T	.	.	.200 <T	.	.	BOL	BOL	
JUL	BOL	.050 <T	.	.200 <T	.	.	.200 <T	.	.	BOL	BOL	
AUG	BOL	BOL	.	BOL	.	.	BOL	.	.	BOL	BOL	
SEP	BOL	BOL	.	BOL	.	.	BOL	.	.	BOL	BOL	
OCT	BOL	BOL	.	.050 <T	.	.	.050 <T	.	.	BOL	BOL	
NOV	BOL	.050 <T	.	.100 <T	.	.	.100 <T	.	.	BOL	BOL	
DEC	BOL	.050 <T	.	.100 <T	.	.	.100 <T	.	.	.100 <T	.100 <T	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT FRANCES WTP 1990

WATER TREATMENT PLANT		DISTRIBUTION SYSTEM					
SITE TYPE	RAW	TREATED	SITE 1		SITE 2		SITE 3
			STANDING	FREE FLOW	STANDING	FREE FLOW	
T1,2DICHOROETHYLENE (UG/L)							
			DET'N LIMIT = 0.10		GUIDELINE = 70 (D1)		
JAN	BOL	IEF		BOL		BOL	BOL
FEB	BOL	BOL		BOL		BOL	BOL
MAR	BOL	BOL		BOL		BOL	BOL
APR	BOL	BOL		.500 <T			BOL
MAY	BOL	BOL		BOL			BOL
JUN	BOL	BOL		BOL			BOL
JUL	BOL	BOL		BOL			BOL
AUG	BOL	BOL		BOL			BOL
SEP	BOL	BOL		BOL			BOL
OCT	BOL	BOL		BOL			BOL
NOV	BOL	BOL		BOL			BOL
DEC	BOL	BOL		BOL			BOL
CHLOROFORM (UG/L)							
			DET'N LIMIT = 0.10		GUIDELINE = 350 (A1+)		
JAN	BOL	IEF		67.600		68.600	68.600
FEB	BOL	73.600		74.600			64.800
MAR	BOL	95.500		84.700			83.200
APR	BOL	98.300		85.100			75.200
MAY	BOL	76.900		75.800			78.600
JUN	BOL	160.000		175.900			97.100
JUL	BOL	95.400		82.600			83.800
AUG	BOL	94.700		83.400			73.100
SEP	BOL	96.300		89.900			88.100
OCT	BOL	47.900		34.900			60.800
NOV	BOL	79.000		79.200			78.300
DEC	BOL	68.900		57.900			62.100
111, TRICHLOROETHANE (UG/L)							
			DET'N LIMIT = 0.02		GUIDELINE = 200 (D1)		
JAN	BOL	IEF		BOL		BOL	BOL
FEB	BOL	BOL		BOL			BOL
MAR	BOL	BOL		BOL			BOL
APR	BOL	BOL		BOL			BOL
MAY	BOL	BOL		BOL			BOL
JUN	BOL	BOL		BOL			BOL
JUL	BOL	BOL		BOL			BOL
AUG	BOL	BOL		BOL			BOL
SEP	BOL	BOL		BOL			BOL
OCT	BOL	BOL		BOL			BOL
NOV	BOL	BOL		BOL			BOL
DEC	BOL	BOL		.040 <T			BOL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT FRANCES WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

SITE TYPE	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
DICHLOROBROMOMETHANE (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = 350 (A1+)			
JAN	BOL	IEF		2.350		2.450		2.450
FEB	BOL	2.550		2.550				2.300
MAR	BOL	2.850		2.650				2.700
APR	BOL	2.950		2.800				2.550
MAY	BOL	2.150		2.050				2.300
JUN	BOL	4.250		4.000				2.900
JUL	BOL	2.500		2.350				2.300
AUG	BOL	3.000		2.800				2.550
SEP	BOL	3.050		2.900				2.750
OCT	BOL	1.750		1.300				2.100
NOV	BOL	2.600		2.550				2.450
DEC	BOL	2.350		2.100				2.250
CHLORODIBROMOMETHANE (UG/L)			DET'N LIMIT = 0.10		GUIDELINE = 350 (A1+)			
JAN	BOL	IEF		BOL		BOL		BOL
FEB	BOL	BOL		BOL				BOL
MAR	BOL	BOL		BOL				BOL
APR	BOL	BOL		BOL				BOL
MAY	BOL	BOL		BOL				BOL
JUN	BOL	.100 <T		.100 <T				.100 <T
JUL	BOL	BOL		BOL				BOL
AUG	BOL	BOL		BOL				BOL
SEP	BOL	BOL		BOL				BOL
OCT	BOL	BOL		BOL				BOL
NOV	BOL	BOL		BOL				BOL
DEC	BOL	BOL		BOL				BOL
T-CHLOROETHYLENE (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = 5 (D1)			
JAN	BOL	IEF		BOL		BOL		BOL
FEB	BOL	BOL		BOL				BOL
MAR	BOL	BOL		BOL				BOL
APR	BOL	BOL		BOL				BOL
MAY	BOL	BOL		BOL				BOL
JUN	BOL	BOL		BOL				.100 <T
JUL	BOL	BOL		BOL				BOL
AUG	BOL	BOL		BOL				BOL
SEP	BOL	BOL		BOL				BOL
OCT	BOL	BOL		BOL				BOL
NOV	BOL	BOL		BOL				BOL
DEC	BOL	BOL		BOL				BOL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM FORT FRANCES WTP 1990
DISTRIBUTION SYSTEM

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

SITE TYPE	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
1,4 DICHLOROBENZENE (UG/L)								
			DET'N LIMIT = 0.10		GUIDELINE = 5 (A1)			
JAN	BOL	IEF		BOL		BOL		BOL
FEB	BOL	BOL		BOL		BOL		BOL
MAR	BOL	BOL		BOL		BOL		BOL
APR	BOL	BOL		BOL		BOL		BOL
MAY	BOL	BOL		BOL		BOL		BOL
JUN	BOL	BOL		BOL		BOL		BOL
JUL	BOL	BOL		BOL		BOL		BOL
AUG	BOL	BOL		BOL		BOL		BOL
SEP	100 <T	BOL		BOL		BOL		BOL
OCT	BOL	BOL		BOL		BOL		BOL
NOV	BOL	BOL		BOL		BOL		BOL
DEC	100 <T	BOL		BOL		BOL		BOL
TOTAL TRINALONETHANES (UG/L)								
			DET'N LIMIT = 0.50		GUIDELINE = 350 (A1)			
JAN	BOL	IEF		69.900		71.050		71.050
FEB	BOL	76.150		77.200				67.150
MAR	BOL	98.350		87.350				85.900
APR	BOL	101.250		87.900				77.750
MAY	BOL	79.050		77.900				80.900
JUN	BOL	164.350		180.000				100.100
JUL	BOL	97.900		84.950				86.100
AUG	BOL	97.700		86.250				75.600
SEP	BOL	99.350		92.800				90.850
OCT	BOL	49.600		36.250				62.900
NOV	BOL	81.600		81.700				80.750
DEC	BOL	71.200		60.000				64.300

TRACE LEVELS OF TOLUENE ARE LABORATORY ARTIFACTS DERIVED FROM THE ANALYTICAL METHODOLOGY.

TRACE LEVELS OF STYRENE ARE CONSIDERED TO BE LABORATORY ARTIFACTS RESULTING FROM THE LABORATORY SHIPPING CONTAINERS.

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
BACTERIOLOGICAL			
FECAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	0 (A1)
STANDARD PLATE COUNT MEMBRANE FILT.	CT/ML	0	500/ML (A3)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100ML (A1)
CHEMISTRY (FLD)			
FIELD COMBINED CHLORINE RESIDUAL	MG/L	0	N/A
FIELD TOTAL CHLORINE RESIDUAL	MG/L	0	N/A
FIELD FREE CHLORINE RESIDUAL	MG/L	0	N/A
FIELD PH	DMNSLESS	N/A	6.5-8.5 (A3)
FIELD TEMPERATURE	DEG.C	N/A	15.0 (A3)
FIELD TURBIDITY	FTU	N/A	1.0 (A1)
CHEMISTRY (LAB)			
ALKALINITY	MG/L	0.2	30-500 (A3)
AMMONIUM TOTAL	MG/L	0.002	0.05 (F2)
CALCIUM	MG/L	0.2	100 (F2)
CHLORIDE	MG/L	0.2	250 (A3)
COLOUR	TCU	0.5	5.0 (A3)
CONDUCTIVITY	UMHO/CM	1.0	400 (F2)
CYANIDE	MG/L	0.001	0.2 (A1)
DISSOLVED ORGANIC CARBON	MG/L	0.1	5.0 (A3)
FLUORIDE	MG/L	0.01	2.4 (A1)
HARDNESS	MG/L	0.5	80-100 (A4)
LANGELIERS INDEX	DMNSLESS	N/A	N/A
MAGNESIUM	MG/L	0.1	30.0 (F2)
NITRITE	MG/L	0.001	1.0 (A1)
NITROGEN TOTAL KJELDAHL	MG/L	0.02	N/A
PH	DMNSLESS	N/A	6.5-8.5 (A4)
PHOSPHORUS FIL REACT	MG/L	0.0005	N/A
PHOSPHORUS TOTAL	MG/L	0.002	0.4 (F2)
SODIUM	MG/L	0.2	200 (A4)
SULPHATE	MG/L	0.2	500 (A3)
TOTAL NITRATES	MG/L	0.005	10.0 (A1)
TURBIDITY	FTU	0.05	1.0 (A1)
CHLOROAROMATICS			
123 TRICHLOROBENZENE	NG/L	5.0	N/A
1234 TETRACHLOROBENZENE	NG/L	1.0	N/A
1235 TETRACHLOROBENZENE	NG/L	1.0	N/A
124 TRICHLOROBENZENE	NG/L	5.0	10000 (1)
1245-TETRACHLOROBENZENE	NG/L	1.0	38000 (D4)
135 TRICHLOROBENZENE	NG/L	5.0	N/A
236 TRICHLOROTOLUENE	NG/L	5.0	N/A
245 TRICHLOROTOLUENE	NG/L	5.0	N/A
26A TRICHLOROTOLUENE	NG/L	5.0	N/A
HEXACHLOROBENZENE	NG/L	1.0	10 (C1)
HEXACHLOROBUTADIENE	NG/L	1.0	450 (D4)
HEXACHLOROCYCLOPENTADIENE	NG/L	5.0	206000 (D4)
HEXACHLOROETHANE	NG/L	1.0	1900 (D4)
OCTACHLOROSTYRENE	NG/L	1.0	N/A
PENTACHLOROBENZENE	NG/L	1.0	74000 (D4)
CHLOROPHENOLS			
234 TRICHLOROPHENOL	NG/L	100.0	N/A
2345 TETRACHLOROPHENOL	NG/L	20.0	N/A
2356 TETRACHLOROPHENOL	NG/L	10.0	N/A

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
245 TRICHLOROPHENOL	NG/L	100.0	2600000 (D4)
246 TRICHLOROPHENOL	NG/L	20.0	5000 (A1)
PENTACHLOROPHENOL	NG/L	10.0	60000 (A1)
METALS			
ALUMINUM	UG/L	0.10	100 (A4)
ANTIMONY	UG/L	0.05	146 (D4)
ARSENIC	UG/L	0.10	25 (A1)
BARIUM	UG/L	0.05	1000 (A2)
BERYLLIUM	UG/L	0.05	6800 (D4)
BORON	UG/L	2.00	5000 (A1)
CADMIUM	UG/L	0.05	5 (A1)
CHROMIUM	UG/L	0.50	50 (A1)
COBALT	UG/L	0.02	N/A
COPPER	UG/L	0.50	1000 (A3)
IRON	UG/L	6.00	300 (A3)
LEAD	UG/L	0.05	10 (A1)
MANGANESE	UG/L	0.05	50 (A3)
MERCURY	UG/L	0.02	1 (A1)
MOLYBDENUM	UG/L	0.05	N/A
NICKEL	UG/L	0.20	350 (D3)
SELENIUM	UG/L	1.00	10 (A1)
SILVER	UG/L	0.05	50 (A1)
STRONTIUM	UG/L	0.10	N/A
THALLIUM	UG/L	0.05	13 (D4)
TITANIUM	UG/L	0.50	N/A
URANIUM	UG/L	0.05	100 (A1)
VANADIUM	UG/L	0.05	N/A
ZINC	UG/L	0.20	5000 (A3)
PAH			
ANTHRACENE	NG/L	1.0	N/A
BENZO(A) ANTHRACENE	NG/L	20.0	N/A
BENZO(A) PYRENE	NG/L	5.0	10.0 (A1)
BENZO(B) CHRYSENE	NG/L	2.0	N/A
BENZO(B) FLUORANTHENE	NG/L	10.0	N/A
BENZO(E) PYRENE	NG/L	50.0	N/A
BENZO(G,H,I) PERYLENE	NG/L	20.0	N/A
BENZO(K) FLUORANTHENE	NG/L	1.0	N/A
CHRYSENE	NG/L	50.0	N/A
CORONENE	NG/L	10.0	N/A
DIBENZO(A,H) ANTHRACENE	NG/L	10.0	N/A
DIMETHYL BENZO(A) ANTHRACENE	NG/L	5.0	N/A
FLUORANTHENE	NG/L	20.0	42000.0 (D4)
INDENO(1,2,3-C,D) PYRENE	NG/L	20.0	N/A
PERYLENE	NG/L	10.0	N/A
PHENANTHRENE	NG/L	10.0	N/A
PYRENE	NG/L	20.0	N/A
PESTICIDES & PCB			
ALACHLOR (LASSO)	NG/L	500.0	5000 (A2)
ALDRIN	NG/L	1.0	700 (A1)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700 (G)
ALPHA CHLORDANE	NG/L	2.0	7000 (A1)
AMETRINE	NG/L	50.0	300000 (D3)
ATRAZONE	NG/L	50.0	N/A
ATRAZINE	NG/L	50.0	60000 (A2)
DES ETHYL ATRAZINE	NG/L	200.0	60000 (A2)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300 (G)
CYANAZINE (BLADAX)	NG/L	100.0	10000 (A2)
O,P-DDD	NG/L	5.0	10 (I)
DIELDRIN	NG/L	2.0	700 (A1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000 (D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	5.0	74000 (D4)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
ENDOSULFAN SULPHATE (THIODAN SULPHATE)	NG/L	5.0	N/A
ENDRIN	NG/L	5.0	1600 (D3)
GAMMA CHLORDANE	NG/L	2.0	7000 (A1)
HEPTACHLOR	NG/L	1.0	3000 (A1)
HEPTACHLOR EPOXIDE	NG/L	1.0	3000 (A1)
LINDANE (GAMMA BHC)	NG/L	1.0	4000 (A1)
METHOXYCHLOR	NG/L	5.0	900000 (A1)
METOLACHLOR	NG/L	500.0	50000 (A2)
METIBUZIN (SENCOR)	NG/L	100.0	80000 (A1)
MIREX	NG/L	5.0	N/A
P,P-DDD	NG/L	5.0	N/A
O,P-DDT	NG/L	5.0	30000 (A1)
OXYCHLORDANE	NG/L	2.0	N/A
PCB	NG/L	20.0	3000 (A2)
PPDDE	NG/L	1.0	30000 (A1)
PPDDT	NG/L	5.0	30000 (A1)
PROMETONE	NG/L	50.0	52500 (D3)
PROMETRYNE	NG/L	50.0	1000 (A2)
PROPACINE	NG/L	50.0	700000 (D3)
SIMAZINE	NG/L	50.0	10000 (A2)
D-ETHYL SIMAZINE	NG/L	200.0	10000 (A2)
TOXAPHENE	NG/L	500.0	5000 (A1)
PHENOLICS			
PHENOLICS (UNFILTERED REACTIVE)	UG/L	0.2	2 (A4)
SPECIFIC PESTICIDES			
2,4 D PROPIONIC ACID	NG/L	100.	N/A
2,4,5-TRICHLOROPHENOXY ACETIC ACID	NG/L	50.	280000 (A1)
2,4-DICHLOROBUTYRIC ACID (2,4-D)	NG/L	100.	100000 (A1)
2,4-DICHLOROPHENOXYBUTYRIC ACID (2,4-DB)	NG/L	200.	18000 (B3)
BUTYLATE (SUTAN)	NG/L	2000.	245000 (D3)
CARBARYL (SEVIN)	NG/L	200.	90000 (A1)
CARBOFURAN	NG/L	2000.	90000 (A1)
CHLORPYRIFOS (DURSABAN)	NG/L	20.	N/A
CICP (CHLORPROPHAM)	NG/L	2000.	350000 (G)
DIALLATE	NG/L	2000.	N/A
DIAZINON	NG/L	20.	20000 (A1)
DICAMBA	NG/L	50.	120000 (A1)
DICHLOROVOS	NG/L	20.	N/A
EPTAM	NG/L	2000.	N/A
ETHION	NG/L	20.	35000 (G)
IPC	NG/L	2000.	N/A
MALATHION	NG/L	20.	190000 (A1)
METHYL PARATHION	NG/L	50.	7000 (B3)
METHYLTRITHION	NG/L	20.	N/A
NEVINPHOS	NG/L	20.	N/A
PARATHION	NG/L	20.	50000 (A1)
PHORATE (THIMET)	NG/L	20.	2000 (A2)
PROPOXUR (BAYGON)	NG/L	2000.	140000 (D3)
RELDAN	NG/L	20.	N/A
ROMNEL	NG/L	20.	N/A
SILVEX (2,4,5-TP)	NG/L	20.	10000 (A1)
VOLATILES			
1,1 DICHLOROETHANE	UG/L	0.10	N/A
1,1 DICHLOROETHYLENE	UG/L	0.10	7 (D1)
1,2 DICHLOROBENZENE	UG/L	0.05	200 (A1)
1,2 DICHLOROETHANE	UG/L	0.05	5 (A1)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
1,2 DICHLOROPROPANE	UG/L	0.05	5 (D1)
1,3 DICHLOROBENZENE	UG/L	0.10	3750 (D3)
1,4 DICHLOROBENZENE	UG/L	0.10	5 (A1)
111, TRICHLOROETHANE	UG/L	0.02	200 (D1)
112 TRICHLOROETHANE	UG/L	0.05	0.6 (D4)
1122 TETRACHLOROETHANE	UG/L	0.05	0.17 (D4)
BENZENE	UG/L	0.05	5 (A1)
BROMOFORM	UG/L	0.20	350 (A1+)
CARBON TETRACHLORIDE	UG/L	0.20	5 (A1)
CHLOROBENZENE	UG/L	0.10	1510 (D3)
CHLORODIBROMOMETHANE	UG/L	0.10	350 (A1+)
CHLOROFORM	UG/L	0.10	350 (A1+)
DICHLOROBROMOMETHANE	UG/L	0.05	350 (A1+)
ETHYLENE DIBROMIDE	UG/L	0.05	50 (D1)
ETHYLBENZENE	UG/L	0.05	2.4 (A3)
M-XYLENE	UG/L	0.10	300 (A3*)
METHYLENE CHLORIDE	UG/L	0.50	50 (A1)
O-XYLENE	UG/L	0.05	300 (A3*)
P-XYLENE	UG/L	0.10	300 (A3*)
STYRENE	UG/L	0.05	100 (D1)
TETRACHLOROETHYLENE	UG/L	0.05	5 (D1)
TRANS 1,2 DICHLOROETHYLENE	UG/L	0.10	70 (D1)
TOLUENE	UG/L	0.05	24 (A3)
TOTAL TRIHALOMETHANES	UG/L	0.50	350 (A1)
TRICHLOROETHYLENE	UG/L	0.10	50 (A1)

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM PROGRAM DESCRIPTION

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality;
- a flagging mechanism for guideline exceedance;
- a definition of contaminant levels and trends;
- a comprehensive background for remedial action;
- a framework for assessment of new contaminants; and
- an indication of treatment efficiency of plant processes.

PROGRAM

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario. In 1990, 76 systems were being monitored. Water supply locations have been prioritized for surveillance based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit.

A major goal of the program is to collect valid water quality data in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analyzed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling, in order to acquire complete plant process and distribution system details and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of raw (ambient water) and treated water at the treatment plant and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled. Sampling is carried out by operational personnel who have been trained in applicable procedures.

Comprehensive standardized procedures and field test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". Most laboratory analyses are carried out by the Ministry of Environment (MOE), Laboratory Services Branch. Radionuclides are analyzed by the Ministry of Labour.

DATA REPORTING MECHANISM

When the analytical results are transferred from the MOE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOE District Officer, the appropriate operational staff and are also retained by the DWSP unit.

PROGRAM INPUTS AND OUTPUTS

There are four major inputs and four major outputs in the program.

Program Input - Plant and Distribution System Description

The system description includes plant specific non-analytical information acquired through a questionnaire and an initial plant visit. During the initial assessment of the plant and distribution system, questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The Plant and Distribution System Description consists of the following seven components:

1. PROCESS COMPONENT INVENTORY

All physical and chemical processes to which the water is subjected, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. TREATMENT CHEMICALS

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. Chemical dosages applied on the day of sampling are recorded in DWSP.

3. PROCESS CONTROL MEASUREMENTS

Documentation of in-plant monitoring of process parameters (eg. turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. Except for the recorded Field Data, in-plant monitoring results are not retained in DWSP but are retained by the water treatment plant personnel.

4. DESIGN FLOW AND RETENTION TIME

Hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. Maximum, minimum and average flow, as well as a record of the flow rate on the day of sampling, are recorded in DWSP.

5. DISTRIBUTION SYSTEM DESCRIPTION

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. SAMPLING SYSTEM

Each plant is assessed for its adequacy in terms of the sampling of bacteriological, organic and inorganic parameters. Prime considerations in the assessment and design of the sampling system are:

- i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;
- ii/ the water being sampled is not being modified by the sampling system;
- iii/ the sample tap must be in a clean area of the plant, preferably a lab area; and
- iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake,

discharge and tap); pump characteristics (model, type, capacity); and flow rate.

7. PERSONNEL

This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate MOE personnel associated with the plant.

Program Input - Field Data

The second major input to DWSP is field data. Field data is collected at the plant and from the distribution system sites on the day of sampling. Field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling, as well as, monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analyzed according to standardized DWSP protocols to allow for interplant comparison.

Program Input - Laboratory Analytical Data

The third major input to DWSP is Laboratory Analytical Data. Samples gathered from the raw, treated and distribution sampling sites are analyzed for the presence of approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. Parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments, parameters may be measured in a "scan" producing some results for parameters that are not on the DWSP priority list, but which may be of interest. The majority of parameters are measured on a routine basis. Those that are technically more difficult and/or costly to analyze, however, are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change, notation will be made and comparison data documented.

Program Input - Parameter Reference Information

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analyzed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database. An example is shown in figure 1.

Program output - Query

All DWSP information is easily accessed through the Query function, therefore, anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOE offices is being developed by the DWSP group.

Program Output - Action Alerts

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the Ontario Drinking Water Objectives publication. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective, an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of the confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedances at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, guidelines/limits from other agencies are used. The Parameter Listing System, published by MOE (ISBN 0-7729-4461-X), catalogues and keeps current guidelines for 650 parameters from agencies throughout the world. If these guidelines are exceeded, the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

Program Output - Report Generation

Custom reports can be generated from DWSP to meet MOE Regional needs and to respond to public requests.

Program Output - Annual Reports

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG.1

MOE - DRINKING WATER ASSESSMENT PROGRAM (DWSP)

PARAMETER REFERENCE INFORMATION

BENZENE (B2001P)

VOLATILES

CLASS: HEALTH METHOD: POCODO UNIT: µg/L

SOURCE	FROM	TO	METHOD	GUIDELINE	UNIT	NOTE
CAL C	85/01			0.700	µg/L	AL
CDWG C	87/01			5.000	µg/L	MAC
EPA C	87/07			5.000	µg/L	MCL
EPAA C	80/11			6.600	µg/L	AMBIENT **
FERC C	84/05			1.000	µg/L	MCL
WHO C	84/01			10.000	µg/L	GV

DESCRIPTION: NAME: BENZENE

CAS#: 71-43-2

MOLECULAR FORMULAE: C₆H₆

DETECTION LIMIT: (FOR METHOD POCODO) 0.05 µg/L

SYNONYMS: BENZOL; BENZOLE; COAL NAPHTHA; CARBON OIL (27).
CYCLOHEXATRIENE (41).

CHARACTERISTICS: COLOURLESS TO LIGHT-YELLOW, MOBILE, NON-POLAR LIQUID, OF HIGHLY REFRACTIVE NATURE, AROMATIC ODOUR; VAPOURS BURN WITH SMOKING FLAME (30).

PROPERTIES: SOLUBILITY IN WATER: 1780-1800 mg/L AT 25C (41).
THRESHOLD ODOUR: 0.5 - 10 PPM IN WATER
THRESHOLD TASTE: 0.5 mg/L IN WATER (39).

ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING ORGANISMS AND APPEARS TO ACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT A HIGH LIPID CONTENT OR REPRESENT MAJOR METABOLIC SITES, SUCH AS LIVER OR BRAIN; SMALL QUANTITIES EVAPORATE FROM SOILS OR ARE DEGRADED RATHER QUICKLY (80).

SOURCES: COMMERCIAL: PETROLEUM REFINING; SOLVENT RECOVERY; COAL TAR DISTILLATION (39); FOOD PROCESSING AND TANNING INDUSTRIES; COMBUSTION OF CAR EXHAUST.
ENVIRONMENTAL: POSSIBLE SOURCE IS RUNOFF.

USES: DETERGENTS; NYLON; INTERMEDIATE IN PRODUCTION OF OTHER COMPOUNDS, SUCH AS PESTICIDES; SOLVENT FOR EXTRACTION AND RECTIFICATION IN RUBBER INDUSTRY; DEGREASING AND CLEANSING AGENT; GASOLINE.

TOXICITY: RATING: 4 (VERY TOXIC).
ACUTE: IRRITATING TO MUCOUS MEMBRANES; SYMPTOMS INCLUDE RESTLESSNESS, CONVULSIONS, EXCITEMENT, DEPRESSION; DEATH MAY FOLLOW RESPIRATORY FAILURE.
CHRONIC: MAY CAUSE ANAEMIA AND LEUKAEMIA (45); MUTAGENIC.
MODE OF ACTION: CHROMOABERRATION IN LYMPHOCYTE CULTURES.

CARCINOGENICITY: A KNOWN HUMAN CARCINOGEN.

REMOVAL: THE FOLLOWING PROCESSES HAVE BEEN SUCCESSFUL IN REMOVING BENZENE FROM WASTEWATER: GAC ADSORPTION, PRECIPITATION WITH ALUM AND SUBSEQUENT REMOVAL VIA SEDIMENTATION, COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION, OXIDATION

ADDITIONAL PROPERTIES:

MOLECULAR WEIGHT: 78.12
MELTING POINT: 5.5°C (27).
BOILING POINT: 80.1°C (27).
SPECIFIC GRAVITY: 0.8790 AT 20°C (27).
VAPOUR PRESSURE: 100 MM AT 26.1°C (27).
HENRY'S LAW CONSTANT: 0.00555 ATM-M3/MOLE (41).
LOG OCT./WATER PARTITION COEFFICIENT: 1.95 TO 2.13 (39).
CARBON ADSORPTION: K=1.0; 1/N=1.6; R=0.97; PH=5.3 (41)
SEDIMENT/WATER PARTITION COEFFICIENT: NO DATA

NOTES: EPA PRIORITY POLLUTANT.

Appendix B

DWSP SAMPLING GUIDELINE

i) Raw and Treated at Plant

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-220 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (Caution: HNO_3 is corrosive)
Volatiles (duplicates) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle -fill bottle completely without bubbles
Organics (OWOC), (OWTRI), (OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top -when 'special pesticides' are requested three extra bottles must be filled

Cyanide	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops sodium hydroxide (NaOH) (Caution: NaOH is corrosive)
Mercury	-250 mL glass bottle -rinse bottle and cap three times -fill to top of label -add 20 drops each nitric acid (HNO_3) - and potassium dichromate ($\text{K}_2\text{Cr}_2\text{O}_7$) (Caution: HNO_3 & $\text{K}_2\text{Cr}_2\text{O}_7$ are corrosive)
Phenols	-250 mL glass bottle -do <u>not</u> rinse bottle, preservative - has been added -fill to top of label
Radionuclides (as scheduled)	-4 L plastic jug -do <u>not</u> rinse, carrier added -fill to 5 cm from top
Organic Characterization (GC/MS - once per year)	-1 L amber glass bottle; instructions - as per organic -250 mL glass bottle -do <u>not</u> rinse bottle -fill completely without bubbles

Steps:

1. Let sampling water tap run for an adequate time to clear the sample line.
2. Record time of day on submission sheet.
3. Record temperature on submission sheet.
4. Fill up all bottles as per instructions.
5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (Caution: HNO_3 is corrosive)

Steps:

1. Record time of day on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.
5. Fill general chemistry and metals bottles.
6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-250 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked

Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid HNO_3 (Caution: HNO_3 is corrosive)
Volatiles (duplicate) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle, preservative has been added -fill bottle completely without bubbles
Organics (OWOC) (OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top

Steps:

1. Record time of day on submission sheet.
2. Let cold water flow for five minutes.
3. Record temperature on submission sheet.
4. Fill all bottles as per instructions.
5. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.